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THE
JOURNAL
OF THE
ROYAL AGRICULTURAL SOCIETY
OF ENGLAND.

SECOND SERIES.
VOLUME THE TWENTY-FIRST.

PRACTICE WITH SCIENCE.

LONDON:
JOHN MURRAY, ALBEMARLE STREET.
1885.

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THESE EXPERIMENTS, IT IS TRUE, ARE NOT EASY; STILL THEY ARE IN THE POWER OF EVERY THINKING HUSBANDMAN. HE WHO ACCOMPLISHES BUT ONE, OF HOWEVER LIMITED APPLICATION, AND TAKES CARE TO REPORT IT FAITHFULLY, ADVANCES THE SCIENCE, AND, CONSEQUENTLY, THE PRACTICE OF AGRICULTURE, AND ACQUIRES THEREBY A RIGHT TO THE GRATITUDE OF HIS FELLOWS, AND OF THOSE WHO COME AFTER. TO MAKE MANY SUCH IS BEYOND THE POWER OF MOST INDIVIDUALS, AND CANNOT BE EXPECTED. THE FIRST CARE OF ALL SOCIETIES FORMED FOR THE IMPROVEMENT OF OUR SCIENCE SHOULD BE TO PREPARE THE FORMS OF SUCH EXPERIMENTS, AND TO DISTRIBUTE THE EXECUTION OF THESE AMONG THEIR MEMBERS.

VON THAER, *Principles of Agriculture.*

LONDON: PRINTED BY WILLIAM CLOWES AND SONS, LIMITED, STAMFORD STREET
AND, CHANCERY CROSS.

37-196
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DIRECTIONS TO THE BINDER.

The Binder is desired to collect together all the Appendix matter, with Roman numeral folios, and place it at the end of each volume of the Journal, excepting Titles and Contents, and Statistics &c., which are in all cases to be placed at the beginning of the Volume; the lettering at the back to include a statement of the year as well as the volume; the first volume belonging to 1839-40, the second to 1841, the third to 1842, the fourth to 1843, and so on.

In Reprints of the Journal all Appendix matter and, in one instance, an Article in the body of the Journal (which at the time had become obsolete), were omitted; the Roman numeral folios, however (for convenience of reference), were reprinted without alteration in the Appendix matter retained.

Map of a part of the Dominion of Canada, to face page 217.

JOURNAL

OF THE

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

1. *Report on Miscellaneous Implements at Shrewsbury, and of the trials of Machines for cutting and elevating Materials to be preserved in Silos, and of Sheaf-Binding Machinery.* By THOMAS BELL, Hedley Hall, Marley Hill, Newcastle-on-Tyne.

Judges of Implements.

MASON COOKE, the Lawns, Ely, Cambridgeshire; WILLIAM SCOTSON, Rose Lane, Mosely Hill, Liverpool; THOMAS BELL, Hedley Hall, Marley Hill, Newcastle-on-Tyne.

THE Implement sheds in the Showyard of the Royal Agricultural Society of England present great attractions to the British farmer. The Exhibition at Shrewsbury maintained the prestige of the Society in this respect. The long lines of machinery at rest, which ran at right angles to the main avenue, were, as usual, flanked by machinery in motion. Both of these sections were thronged with eager visitors, despite the parades in the Horse-ring and the interesting Lectures and performances in the Working Dairy.

Compared with Reading and York there was a falling-off in the number of articles exhibited. Thus—

	Stands.	Articles.
Reading. . . .	377	5960
York	401	6058
Shrewsbury . . .	367	5241

To the ordinary observer the decrease was not perceptible. The presence of silos, filled and unfilled, and the various appliances for cutting, elevating, and pressing the materials to

be converted into Silage, were a new feature, and evoked the liveliest interest amongst stockowners and the public generally.

In the Catalogue of Implements, the words (*New Implement*) in brackets, not unfrequently follow the number of the article in the Catalogue. Articles so marked were each the subject of special and careful inspection by the Judges.

In the printed regulations for the exhibition and trial of agricultural implements, machinery, &c., appeared the following notice:—

SILVER MEDALS.—For New Inventions. There are ten Silver Medals, the award of which the Judges appointed by the Council have the power of recommending in cases of sufficient merit in new implements exhibited at the Shrewsbury Show.

These Medals cannot *in any case* be awarded to any implement unless the principle of the implement or the improvement of it be entirely new.

Much indignation was felt, and in some cases expressed, by both the Stewards and Judges at the number of articles designated as "*new implements*" which had not the most remote claim to any such appellation. The general reply by the exhibitor in such case to enquiries for the new implement, was a shrug of the shoulder, and possibly a remark that it was new to them.

It has doubtless been the subject of frequent remarks amongst both exhibitors and visitors that, out of that vast and truly magnificent display of implements only two articles, and these very simple ones, should have been held worthy to receive the Silver Medal of the Society. The Judges, however, had to be guided by the "Regulations" from which quotation has already been made, and which further states that "No medal shall in any case be awarded to any implement or miscellaneous article capable of trial until it has been subjected to such trial as the Stewards may direct." Of this regulation the Judges highly approved.

It is obvious that only a limited number of implements, and those necessarily of a simple character, could conveniently be subjected to trials in the Showyard. Several of these implements so tested did not maintain the high character for practical work which their exhibitors claimed for them. There were a large number of machines for which new attachments and great improvements were claimed: amongst these were Bone-mills, Stone-breakers, Threshing-machines, Corn-mills, Spring Engines, &c. &c.; but the Judges felt they were not warranted in recommending the Medal of the Society to be awarded to such articles, unless they were proved to be efficient by exhaustive trials, for which neither time nor opportunity could conveniently be had. Nothing short of competitive classified trials would justify the stamp of honour of the Royal Society being affixed to such

machinery. The series of special trials of ensilage cutters and elevators, which took place this season in the Showyard, and those of sheaf-binders, which took place afterwards in the county, afforded ample proof that the Council is fully alive to the necessities of both implement manufacturers and implement buyers in this respect; and that the interests of the latter class must not be overlooked in their desire to promote the success of their patrons—the exhibitors.

A prize of 25*l.* was offered for the most efficient machine for cutting and elevating materials to be preserved in Silos. The trials took place in a small yard adjoining the Showyard. They commenced on Thursday the 10th of July. On that and the following day the visitors were limited to the officials of the Society and the exhibitors. On Saturday, when the Showyard was open to the public, a considerable number of visitors found out this rather out-of-the-way yard, and displayed great interest in the work of the various machines.

There were eight machines presented for trial by the following makers:—

Albaret.

Bust.

Burlingham and Innes.

Carson and Toone.

Crowley.

Lister.

Maynard.

Richmond and Chandler.

The machines were tried with grass, oats, tares, and gorse. It not unfrequently happens in the trials of new machines that some of them, from want of sufficient trial beforehand, enter the competition in such a condition that they but imperfectly fulfil the necessary conditions. Seldom, if ever, was such the case to a greater extent than in the present trials. According to the conditions of trial, the machines had not only to cut the wet fodder efficiently, but also to elevate it to a height sufficient to fill an over-ground "silo." It was in this latter condition that failure was so universal. So far as cutting the fodder and feeding up to the knives, there was no difficulty; the question of clearing away from the knives to the elevator, however, is one which has not been satisfactorily solved at present.

Speaking generally, the machines as ensilage-cutters are the same in general design as the chaff-cutters of the respective makers.

For elevating the cut fodder, two systems, or a combination of the two, were adopted.

In the first a fan-blast, "obtained from paddles or blades attached to the periphery of the knife-wheel, which either by the current of air generated blew the cut fodder to the required

height (of which class Mons. Albaret's machine was the most typical), or merely delivered it on to the apron of the elevator.

The second system dispensed with the fan-blast, and trusted either to the position of the travelling elevator to pick up the cut fodder, or the machine was provided with a horizontal travelling apron, upon which the cut material fell; and which delivered it on to the elevator. Messrs. Richmond and Chandler's machine was of this latter class.

Although the greater number of machines were provided with paddles on the rim of the knife-wheel, the result of the trials showed that such machines take very much more power to drive than those without such blades. This is only what might have been expected when one considers the power which may be absorbed by working a fan for creating a current of air for ventilating purposes, or for stack-drying, as was shown at recent trials, and which would be considerably more than the power necessary to drive an ordinary elevator. In M. Albaret's machine the work absorbed by creating such a current of air as escaped from the top of his elevating-tube, in addition to lifting the cut material, was evidently very considerable. There is also the increased liability of the paddles carrying round the cut material at starting, and causing it to choke between the case of the machines and the paddles. This, in the trials of the machines, proved a most fruitful source of failure.

The machines were driven by means of one of Messrs. Aveling and Porter's 8-horse power traction engines, which was kindly lent for the purpose. Between the engine and the machine under trial one of the Society's rotary dynamometers was interposed, so that the power necessary to work each machine might be tested. This, however, was not found to be so easy as might have been expected in the first instance, as many of the machines, when they began to choke, not only absorbed more power than the dynamometer would indicate, but at times pulled up the engine. As a consequence the readings are very variable. Taking the general performance of the machines, Messrs. Richmond and Chandler's certainly proved itself the best. At starting in the first trial they met with an accident to their elevator; but as this accident arose from a cause outside of the machine, it was decided by the Judges to allow it to compete after repairs had been effected.

The details of the gearing, feed, and knives of the machine, No. 1630, were generally the same as in the chaff-cutter entered by the same makers for the trials at Oxford, which there was awarded the first prize, and which is fully described and illustrated in the Society's 'Journal,' vol. vi. pt. 2, pages 480, 481, and 482, and the present machine fully maintained the repute gained at

Oxford by Messrs. Richmond and Chandler for excellence of design and workmanship. So far as I know, the most important addition to the working part of the machine since the Oxford trials is the pedal action, which no doubt is of use as enabling the operator to regulate his machine while his hands are occupied in feeding. The travelling apron and feed arrangements are the same as at Oxford. The very ingenious arrangement of internal gearing for altering the speed of the feed (i.e. altering the length of cut) without stopping the machine, is very clearly illustrated and described in the account of the Oxford trials; it was then a novel feature in the machine, it has now stood the test of some years of work with a satisfactory result. The pressure of the feed-rolls is maintained by two separate springs. This is not new, but I notice it as having an advantage over the counterbalance weight, in that the pressure from the springs increases as the depth of feed increases, whereas in the counterbalance the load is uniform.

Looking at the cutting done by this machine, it was remarkably clean and regular, and effected with a very small amount of power: this is to a great extent due to the curve of the knives, which present a cutting edge $2\frac{1}{4}$ times the length of the feeding mouth; the amount of draw in the cut is therefore very considerable.

As the fodder is cut and drops down it is received on to a horizontal travelling canvas apron, which carries the cut stuff back to the elevator. The elevator is merely a travelling canvas web, with cross battens or paddles fixed on it, mounted on a light portable frame and inclined at an angle of about 45° . The frame of the elevator is secured to part of the framing of the cutter, and the canvas is driven by a belt from the shaft of the cutter. The particular elevator attached to this machine was scarcely of sufficient height to be of much practical value in filling a 'silo.' The height of delivery from the ground was only 7ft. 6in. It would, however, be a very easy matter to increase this height, and the extra power to work the machine would be but small.

The canvas of which the elevator was made was much too light, and would be much affected by the wet stuff. This is certainly capable of improvement.

The following description and drawing of this machine will make the details of its construction clear to the reader:—

This is a powerful cutting machine, fitted with an open rising cover to prevent choking. It has three strong knives on the fly-wheel, and the rise and fall of the top roller is regulated by two spiral springs in the place of a weight and lever. It has especial safeguards to prevent accident to the attendant by an instantaneous stop motion that can be worked by either hand or foot, also

6 *Report on Miscellaneous Implements at Shrewsbury, &c.*

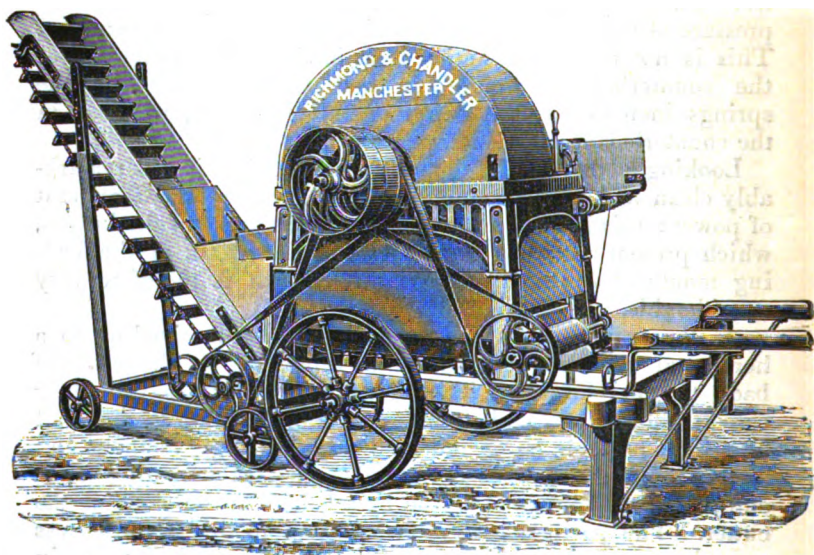
a reverse motion that would be immediately put into action in the event of the man's safety being endangered.

The hopper is fitted with an endless web that delivers the material in regular quantity to the feed-rollers. The fly-wheel is protected by a wooden cover that prevents the cut stuff flying about and clogging the gearing.

The apparatus for delivering the cut silage into the silo consists of a revolving web working at the bottom of a trough underneath the machine, and upon which the cut material falls; this rapidly delivers it to an elevator worked by a chain gearing which, in its turn, conveys it into the silo.

The whole machine is very portable, being fitted with wheels and shafts for facility of transit.

Fig. 1.—*Messrs. Richmond and Chandler's New Ensilage Cutter.*



Some of the distinctive features of the machine are:—

The alteration of cut on the first motion wheels. The rise and fall of pressure over the rollers being regulated by spiral springs instead of the old-fashioned weight and lever. The rising presser being hinged to the axle and adjustable for acting upon the different substances. The rising presser being open in front to obviate choking. The foot-treadle stop-motion and change of cut being effected by the foot or hand. The endless feeding-web, always travelling in same direction as the rollers, either forward or backward.

Each competing machine was allowed to cut a small quantity of grass as a preliminary run, to get all their parts adjusted and into proper working order.

The grass was in fair condition for cutting, not quite dry, but only slightly damp.

This machine commenced at 11.30 to cut one ton of grass.

A cart was placed so as to receive the cut grass as it dropped from the elevators, which discharged at a height of 7 ft. 6 in. The length of cut was $\frac{3}{8}$ of an inch. Three men pitched the grass, and two fed the machine. The feeding was very regular, and all went well for 3 minutes and 20 seconds, when a breakage occurred of the travelling apron which carried the cut material as it drops from the knives forward to the endless web which acts as an elevator. A collection of cut grass was formed beneath the knives, which material had undoubtedly choked the travelling-apron, causing a cessation of delivery, and hence the breakage. The exhibitor asserted that the accident occurred from a stoppage of the elevator caused by the cut material in the cart becoming piled against the mouth of the elevator. This explanation being somewhat doubtful, the Judges, with the approval of the Stewards of Implements, informed Messrs. Richmond and Chandler that, if the machine were repaired in time, another trial would be granted. The machine was therefore again placed in position after the other competing machines had been tried once over. A ton of grass was then cut, without any further hitch than the loss of one of the paddles off the travelling apron, which, however, did not appear to interfere with the work. This was followed by a ton of green oats, which was satisfactorily cut in 5 minutes 18 seconds. A ton of tares was then put through in an equally satisfactory manner. The power, as shown by the dynamometer, was very regular, and the machine worked very smoothly.

Messrs. John Crowley and Co.'s Machine.—The elevator of this machine was 10 feet long, and raised material to a height of 10 feet, the knife-wheel of the machine throwing the cut material into the throat of the elevator at a height of 4 feet. Considerable delay was caused by the travelling web of the elevator refusing to run straight; this was driven by a pulley placed at the extreme run of the elevator. After this was properly adjusted by a preliminary run, a start was made to cut a ton of grass. The work went on for 1 minute 43 seconds, when the intermediate gearing pulled up, and it was then found that the machine was completely blocked by cut material lodged between the knife-wheel and the frame. This was repeated, and, as stated in Table 1, it was considered unnecessary to continue the trial further.

The following description of this machine will enable its construction to be understood :—

This machine is very strongly constructed and is fitted with five knives, and it is adapted for cutting large quantities of grasses or materials for ensilage, and the elevator is designed to deliver to any desired height into the silo or any place of storage. It will cut the chaff into three lengths— $\frac{1}{4}$ in., $\frac{1}{2}$ in., and 1 in.—by merely changing a gear wheel.

The safety feed apparatus is of very great importance. It positively prevents the possibility of accident to the attendant, and at the same time ensures a much more regular feed than the ordinary method—consequently fewer stoppages occur and more work is done.

It is fitted with reversing gear, by which the attendant can stop or reverse the action of the machine at pleasure.

The cutter is mounted on four travelling wheels, which is far preferable to the ordinary two-wheeled machine—being much easier for the horse and also much steadier when in work.

Messrs. F. and J. S. Bust.—Art. No. 4331.—This machine has a five-knived cutter, to the rim of which 5 blades or paddles are attached, which by creating a current of air blows the cut stuff on to the elevator; or delivers it into sacks. The bagging apparatus consists of a delivery-hopper, with a movable division in it, so that with 2 bags fastened to the hopper the stuff may be delivered into either of them at will. Or in filling a sunken silo the cut stuff would be delivered through this hopper.

The feed table in this machine is very large, so that waggons may unload direct on to it.

A special feature is made in this machine of the self-releasing safety lever, which, as in many other machines, is placed in such a position that should a man get his hand caught in the rolls his body would engage against the lever, which in this particular machine acts on a clutch on the fly-wheel shaft, the action of which is claimed to be quicker than any other method. It appears to act satisfactorily, but is open to the criticism that an efficient guard to prevent the possibility of a man getting caught in the first instance would be an improvement. Special facility is arranged for taking off the knife-wheel and replacing it, which is a matter of some importance where a machine having to do a heavy day's work would require to have the knives sharpened two or three times. The cutting edge of these knives is concave. It is assumed that such form of knife tends to draw the stuff to be cut towards the centre of the knives, and does not drive it out as is sometimes the case when knives are made with a reverse curve. The facts, upon which any premises can be based for such an argument, will prove to be that the convex-knife is blunt when the above defect is attributed to it, or that it is not properly set against the mouth of the feeder. The draw with a convex knife is greater than with a concave, and this materially assists the cutting.

The elevator consists of an endless band with paddles attached crosswise, running in a covered trough. This trough is supported at the required inclination by means of wooden raking struts; this appeared somewhat deficient in lateral stiffness, requiring some diagonal bracing.

Three drawings and a good description of this machine are also given in Mr. Jenkins's Report (page 229), to which previous reference has been made.

The elevator of this machine is 22 feet in length, and discharges at a height of 20 feet. The fan-blast delivers the cut material into a covered elevating trough at the top of the cutting machine, a height of 5 feet. The length of cut with a five-knife wheel, was three-eighths of an inch: this can be changed to three-sixteenths or three-quarters of an inch by putting on other cog-wheels.

The trial in grass was got through without any hitch; the feed and delivery were regular. The oat-sheaves were put in unloosed, and went through with great regularity.

Previous to commencing with the tares, a two-knife wheel

was put on to cut a $1\frac{1}{4}$ -inch length. The tares had been a little heated, and were sticky; the cut material was delivered in lumps, with a banging noise, against the top of the machine. The ton of tares was completely cut in 11 min. 20 sec., rather more than twice the time taken by Richmond and Chandler's machine, and with nearly double the expense of power. The feeding was done with the greatest ease by one man, with two men pitching. The machine was fed for one minute with gorse, which was discharged with no more noise than that made by the tares.

Messrs. Lister and Co.—Art. No. 4342.—This machine is arranged in an exceedingly portable form, being mounted on a firmly framed four-wheeled wooden carriage, each wheel of which has a set screw in the boss, the tightening up of which holds the machine quite firmly without any assistance from wedges.

The feeding-table is inclined towards the operator, whereby he is saved considerable labour in feeding.

The knife-wheel is five-bladed, with concave cutting edges; and the fly-wheel is fitted with paddles for blowing the cut stuff into the elevator or sacks—this machine being provided with a bagging appliance very similar to the former one.

The most noticeable feature in this machine is a safety coupling attached to the shaft, in the form of a ratchet, which prevents over-running in the event of the belt being thrown off, or the engine suddenly stopping. It is an ingenious arrangement, novel in its application, and may be of some practical value.

The safety appliance in this machine consists merely of a lever actuating a sliding clutch, which engages in the forward motion of the feed and rollers when the lever is in the backward position towards the operator; when pushed forward it is first disengaged and stops the feed, and when pushed further forward reverses the feed. The lever is placed so that a man's thigh would engage against it in the event of his hand being caught. The arrangement is extremely simple and precise in its action. This was demonstrated to the Judges, otherwise it is doubtful whether they would have witnessed part of the trials of this machine with that amount of equanimity which should characterize official observations.

The pressure on the upper feed-roll is obtained by a weighted counter-balance lever under the machine.

The elevator is driven by means of a chain wheel and gearing from the front end of the main shaft. The endless band was made of Gandy's belting, which appears to be a very suitable material for the purpose, with cross-battens or paddles of wood. The frame of the elevator is jointed, and provision is made for altering the angle of elevation at this point, by which it may more conveniently deliver through the doorway of a loft. The elevator during the time of trial was delivering to a height of about 20 feet.

The supports or struts of the machine were well arranged; they consisted of wrought-iron rods or pipes, attached to the side of the elevator trough by universal joints, so that they might be set at any desired angle.

The machine generally bore evidence of care in the arrangement of details and skill in workmanship.

The price of this machine was given at 27*l.* 15*s.*; but this was obviously below its commercial value. The machine was worked with five concave-shaped knives; and, as stated in the foregoing description, has eight fans attached to the rim of

the wheel. There was no guard to the toothed feed-rollers; and the stop action, good though it was, could not be considered an effective substitute. The elevator was 21 feet in length, and stood at an angle of about 45 degrees.

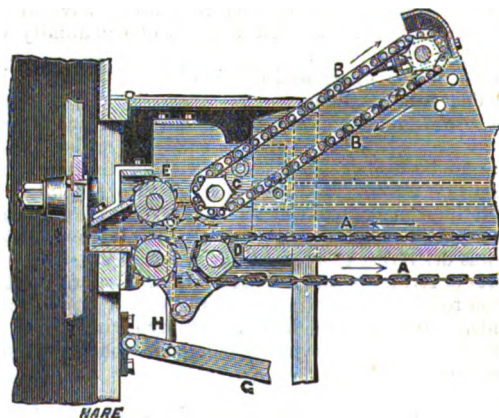
The feeder of the machine during the grass trial evidently counted on time being an important factor in the competition. The result was that, after running 3 min. 35 sec., the elevator ceased to work, and on examination was found to be completely blocked at the throat. Several of the fans were also found to be considerably bent over.

After clearing, the machine was again started and cut out one ton of grass without further hitch. A ton of green oats was also gone through in a satisfactory manner. Without moving the machine, it was made to deliver at the level at the other end, and afterwards a spout was attached, and the cut material delivered into bags, all of which was done very efficiently.

A ton of tares was next cut. They had lain some time, were heated and sticky, but were got rid of in good style: time, 6 min. 26 sec. A quantity of rather strong gorse was got through in an equally satisfactory manner.

Messrs. Burlingham, Innes, and Co.—Art. No. 1708.—This machine was most unfortunate in the trials, as consequent on the choking of the cut stuff in the case round the knives, the machine was quite disabled, the knives breaking, and the case having burst. The fly-wheel of this machine was undoubtedly light.

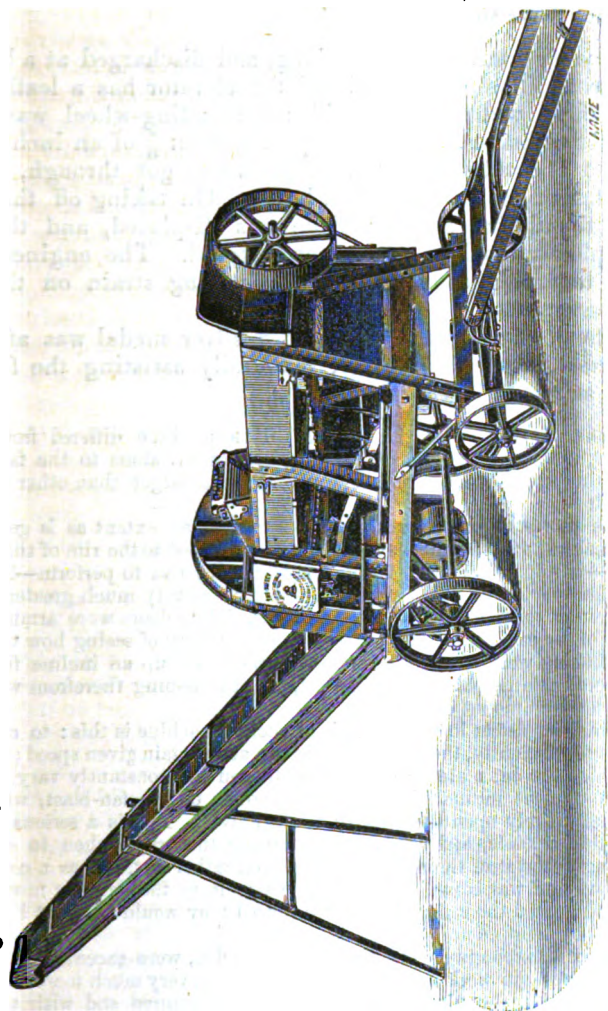
Fig. 2.—Section illustrating the Guard to *Messrs. Burlingham, Innes, and Paternoster's* Chaff-cutter and Elevator.



The notable feature of the machine was the guard attached to the feed, which effectually prevented the possibility of a man getting his hand accidentally caught in the feed-rolls. The following is a description of this part of the machine.

Along the bottom of the feeding-trough is an endless band (A) formed of pitch chain, with wrought-iron cross-bars forming the web. This endless band travels round a pitch wheel (D) close to and at the same level as the bottom feed-roller (F), and when in motion is very similar to the travelling feed in other machines.

Fig. 8.—View of Messrs. Burlingham, Innes, and Paternoster's Chaff-cutter and Elevator.



The upper feed roll (E) is carried in a movable casting, which casting also carries a pair of pitch chain wheels (C); these wheels drive an apron (B) which is inclined backwards from the feed-rolls to the top of the feeding-trough, and extends to such a distance that the feed-rolls cannot be reached by a man's hand.

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The stuff being fed into the feeding-trough is not only carried forward between these two endless chain-bands, but is also compressed, so that rough irregular stuff is fed up evenly to the rolls, and the chain-wheels of the upper band being fixed in the same casting as the upper feed-rolls, the amount of vertical lift must correspond in each. It is mainly as an efficient guard that this arrangement commends itself, and as such it was awarded one of the Society's Silver Medals.

The elevator was 24 feet long, and discharged at a height of 15 feet. The canvas belt of the elevator has a leather band 1 inch in width on each side: the cutting-wheel was worked with five knives, concave-shaped, and cut $\frac{5}{8}$ of an inch lengths. When about half the ton of grass was got through, the case burst, and one of the knives broke. On taking off the case, it was found that another blade was displaced, and the wheel completely blocked by the cut material. The engineer stated that he saw it coming by the increasing strain on the dynamometer.

The feeding guard, to which a silver medal was afterwards awarded, works admirably, materially assisting the feeder as well as regulating the feed.

Mons. Albaret.—Art. No. 2193.—This machine differed from all the others, in that it was the only one which trusted alone to the fan-blast for elevating the cut fodder, and it was very much larger than other competing machines.

The knives were convex, though not to such an extent as is general with our makers, and the fan-blades or paddles attached to the rim of the fly-wheel were—as might be expected from the work they had to perform—larger than in other machines. The peripheral velocity was very much greater.

In order to supply air to the fan-blades, sliding doors were arranged in the front of the case; these also allowed an opportunity of seeing how the cutting and feeding were done. The cut stuff was blown up an incline funnel, and delivered at a height of about 15 feet, the stuff issuing therefrom with a very considerable amount of energy.

The great defect in the principle of such a machine is this: to cut a given material efficiently, the knives should run at a certain given speed; the height to which the cut material has to be delivered will constantly vary, and there is no efficient means of reducing the power of the fan-blast, which must depend entirely upon the velocity of the knives. This is a serious drawback to this principle, and was manifest during the trials, when to ensure the cutting of the stuff the machine was driven rather fast, and as a consequence the cut stuff was blown with undue energy from the delivery mouth of the elevator. Had the knives been more curved they would have cut better; as it was, they chopped and bruised the stuff.

The arrangements for stopping, reversing, &c., were exceedingly ingenious, and appeared to work well; they were, however, very much more complicated than contrivances which seem to attain the required end with very much greater simplicity.

The machine was larger than would be desired to meet the requirements of the English agriculturist, and in justice to the machine it is only fair to state, in looking at the results of the trials, that the feeding was done in a most irregular fashion. This, however, should not affect the quality of the work done, which certainly was more bruised than that of any other machine.

This machine, when placed in position, presented rather an imposing appearance, and so far as elevating and discharging went, it was certainly without a rival in the competition. As previously stated, this was done entirely by fan-blast. The weight of the cut material was driven a distance of 45 feet from the cutting-wheel, and a considerable fringe of the material stretched over an additional 20 feet. In the last volume of this *Journal* (p. 224), in Mr. Jenkins's interesting and exhaustive "Report on the Practice of Ensilage at Home and Abroad," will be found elaborate drawings and descriptions of this machine. In the opening sentence of this description it is stated, "This maize and fodder cutter has been specially designed by us for cutting maize." The trial in the Showyard went far to prove that the machine was much better adapted for the purpose for which it was "specially designed" than for cutting English fodder crops.

During the trial on the first ton of grass a most untoward and unfortunate accident occurred. After working 5 minutes 15 seconds the travelling belt on the bottom of the feeding-trough ceased to run: the engine was stopped, and a piece of iron plate, about 6 inches long and about the size of strong hoop-iron, was found fixed in one of the interstices of the endless band; this plate was painted the exact colour of the machine, and it was naturally assumed that some part had become detached. A close and rather lengthened investigation of the machine was made without any light being thrown on the mysterious introduction of this intruding plate of iron, but sufficient to satisfy all the parties concerned that it formed no part of the machine then under trial. This search, however, brought to light a large crack in one of the fan-blades at the bolt-holes, where it was attached to one of the arms of the knife-wheel. Knowing the speed at which this machine was driven when in action, the Stewards and Judges declined to take the responsibility of working the machine in this condition. M. Albaret suggested that the faulty blade should be taken off, which was done; the machine was again put together and started; but the balance of the wheel was destroyed, and the attendant, who had hitherto fed the machine, declined to resume his post. The fan-blade on the opposite arm was taken off, which restored the balance; operations were then resumed, and the work completed without further hitch.

The feed was irregular in the trial with tares: the mouth of the feeder was small, but was capable of being enlarged by drawing down a hand-lever, which was frequently had recourse to, the machine going empty meantime. The change of length of cut from a quarter of an inch up to 2 inches

was made without stopping the machine; but the cut was not clean, the material delivered had more the appearance of having been masticated than cut. A cover was placed over the end of the elevator, and the cut tares were thus diverted into a cart.

It had been previously arranged that the machines were to be tried on gorse, several tons of which were stored in the yard. Some of the exhibitors showed great delicacy in tackling this material, the stalks of which did look rather strong for making silage. M. Albaret, however, had no hesitation in attacking it; and 102½ lbs. of gorse was cut in 2 minutes 48 seconds. Many of the pieces were quite three-eighths of an inch in diameter; these were delivered into the cart with a noise like a shower of stones.

As is shown in Tables I. and II. (pp. 16 and 18), the power required to drive this machine was enormous for the work which it accomplished; indeed, it required a greater amount of power to drive it when running empty than some of the other machines took when in full work.

Messrs. Carson and Toone.—Art. No. 2593.—This machine was literally a combined cutter and elevator, inasmuch as the elevator was really attached to the machine, which in some respects offers very distinct advantages, as without doubt some of the elevators which had to be fixed independently took some considerable time in fixing. Another feature about this elevator was the arrangement for raising or lowering it, which was effected by a chain and ratchet-wheel. For travelling, the elevator folded back in the middle, thereby reducing its height.

There are four knives with convex cutting surfaces, the cut material falls into the elevator-trough, and is carried from that on the endless web of the elevator, no fan-blades being used.

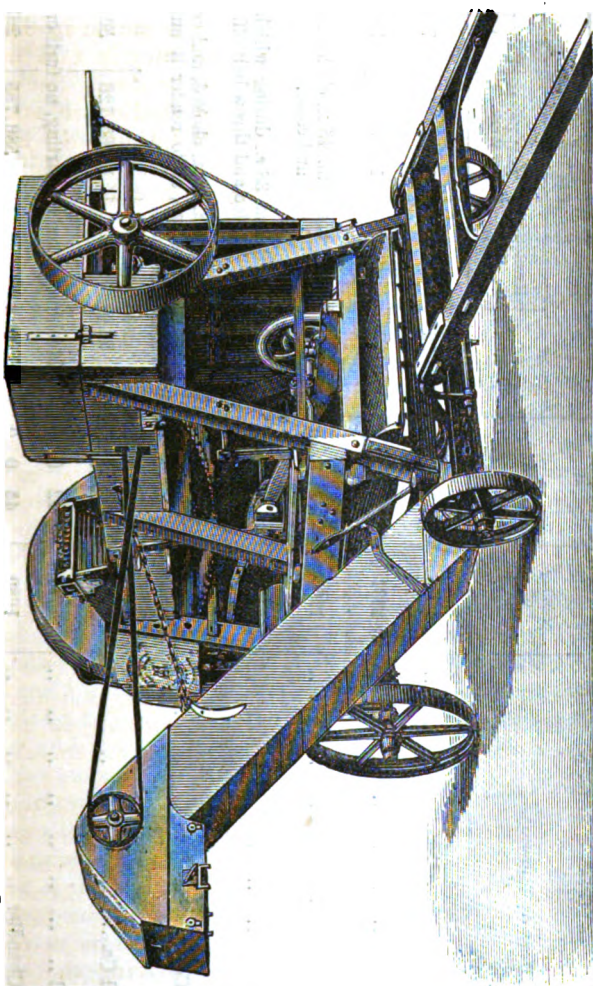
This machine failed in some respects in the trials, but such failure was not due to the want of fan-blades to clear away the cut material.

The safety appliance is very similar to that in other machines where the disengaging lever comes in contact with the operator's body, should he get caught in the machine.

The elevator travelled more rapidly than those of the other competing machines. The length of cut was $\frac{3}{4}$ of an inch, done by a four-knife wheel. The feed was regulated and guarded by a double set of fluted feed-rollers. During the trial, the gearing had frequently to reverse, owing to the first roller taking the grass round instead of delivering it to the second set. After a run of three minutes, the pulley driving the elevator threw off the belt; the elevator trough was found to be blocked. This was cleared, and operations resumed when another block occurred, after a run of 1 min. 53 sec. It was then found that the elevating net was broken, and several of the paddles gone. The elevator was evidently incapable; for during the whole trial

the reverse action was often being used to clear the feed-rollers, which carried the damp grass round instead of delivering it to the knife, which latter therefore did not deliver anything like its full capacity of cut to the elevator.

Fig. 4.—View of Meers. Carson and Toome's Combined Chaff-cutter and Elevator.



Decauville's well-known portable railway was called into requisition by the engineers, the dynamometer being mounted on one of their trollies and shifted on their rails, which greatly facilitated the proceedings.

TABLE I.—RESULTS OF TRIALS OF CHAFF-CUTTERS WITH GRASS.

NAME OF EXHIBITOR.	Number of Article.	Price.	One Ton of Grass.				
			Time.	Revolution per Minute.	Total Units of Work.	Units per lb. Cut.	Average Horse-Power.
T. Christy and Co. (Mons. Albarot)	2193	£ s. d. 100 0 0	m. s. 11 22	854	1,577,246	704.1	4.1
F. and J. S. Bust	4831	{ 40 0 0 10 10 0 }	11 36	..	1,275,580	569.3	3.3
Burlingham, Innes, and Paternoster	1708	60 0 0	{ Machine having run 3 m. 45 s., choked, and burst knives and casea.				
Carson and Toone	2593	37 10 0	{ Machine worked 5 m. 38 s., during which time it choked twice and threw belt off.				
J. Crowley and Co.	1575	35 0 0	{ Machine worked 7 m. 25 s., choked, and on removal of case found so blocked up, as to render it unnecessary to continue trial further.				
R. A. Lister and Co.	4342	{ 22 0 0 5 15 0 }	7 58	..	1,265,126	564.7	4.8
Robert Maynard	4347	42 0 0	Machine choked at starting, no further trial made.				
Richmond and Chandler	1630	45 0 0	7 9	236	586,785	261.9	2.4

Maynard's Machine (No. 4347). This machine was made to cut in lengths from $\frac{3}{8}$ to $\frac{1}{2}$ of an inch. Elevator 18 feet long, which discharged at a height of 14 feet. Unlike any of the other machines, the same endless band which did the elevating at an angle of about 45 degrees, was continued to travel horizontally beneath the machine, and thus received and carried off the material as it fell from the knives. It was a matter for regret that the capacity of this elevator was not tested. The machine failed in the preliminary run. The grass followed round between the feed-roller and the knife-plate, and in a few minutes choked the feed rollers, so that further trial was not possible.

The attention of the Judges was called to the very wide range of power necessary to drive the machines, and it was also pointed out by the Engineer that such was due in most cases to the choking more than the extra power for driving the machine, if working efficiently.

The Judges resolved to give a second trial to the machines exhibited by Richmond and Chandler, Lister and Co., Bust, and Christy and Co. (Albaret's).

In this second trial, Richmond and Chandler's machine cut a ton of grass in 7 min. 9 sec. Reverse action was twice used, owing to the feed not being taken in. One of the paddles again came off the clearing-web, which delivers to the elevator, but the work was not interrupted. On the completion of this trial, the covers were taken off, and the length of cut changed several times while the machine was running.

The weak point in the complete working of the machine was the construction of the travelling-web beneath the knife-wheel which delivers the cut material to the elevator. The clearance in the knife-box was good, and the action smooth and regular.

Lister and Co.'s machine, after being again placed in position, had the elevator-band tightened by a man going aloft to the extreme end, and screwing it up with spanners. When a start was effected, the cut material at once caused the cover of the feeding trough to fly off, and a man kept the cut grass in the trough for some time with a loose board, held in position by hand. After running 1 min. 38 sec., the belt which drives the elevator came off. The cover of the elevator was then repaired, the belt replaced, and the engine started, when the belt again threw, and the machine was found to be partially blocked. The knife was cleared and another start made, which went on for three minutes, the belt meantime frequently slipping, and at the end of that time, though remaining in its place, the pulley came to a standstill. The power given out as shown by the dynamometer was enormous. The machine was found to be entirely blocked at the delivery to the elevator.

TABLE II.—RESULTS OF TRIALS OF CHAFF CUTTERS WITH OATS AND TARES.

NAME OF EXHIBITOR.	Number of Machine.	One Ton of Oats.					One Ton of Tares.				
		Time.	Revolutions per Minute.	Total Units of Work.	Units per lb. Cut.	Average Horse-Power.	Time.	Revolutions per Minute.	Total Units of Work.	Units per lb. Cut.	Average Horse-Power.
		m. s.					m. s.				
Richmond and Chandler	1690	5 18	251	586,785	261.9	3.2	5 22	256	565,977	256.6	2.6
R. A. Lister and Co. ..	4942	6 15	297	1,113,228	496.9	5.4	6 26	347	1,485,752	640.9	6.7
F. and J. S. Bust ..	4931	8 18	..	1,925,469	591.7	5.02	11 20	..	1,061,208	473.7	2.84
T. Christy and Co. ..	2193	Dynamometer readings not taken.					11 24	440	4,018,024	1793.7	10.85
(Mons. Albaret											

Bust's Machine (No. 4333) was next put in position, and cut a ton of grass without any stoppage. The reverse action was used once, owing to a stoppage in the feeding. The delivery had a knocking motion, caused by collections of cut material going out in lumps.

Albare's Machine was fed very irregularly during the second trial. Very distinct thuds were heard when a heavy feed of grass went in, causing a great strain in the machine. As will be seen from the time taken for a ton of grass (11 min. 23 sec.), the machine did not cut half its capacity. The feeding arrangement is evidently better adapted for maize or other strong-stemmed material; the soft grass continually choked the mouth of the feeder: the hand-lever and reverse action were therefore frequently in requisition.

From the foregoing Report of the proceedings in the Trial-yard, which I fear our friends across the Channel will consider is characteristic of the Englishman's "brutal frankness," it will be seen that the Judges had no alternative in making their award, which was as follows:—

We have carefully tried the whole of the machines entered in this competition; we have not found any single machine that completely meets the conditions under which the prize was offered, viz. for an efficient machine for cutting and elevating materials to be preserved in Silos. We consider, however, that Messrs. Richmond & Chandler's machine, No. 1630, is deserving of high commendation for the efficiency of its arrangement for cutting the materials.

(Signed)

MASON COOKE.
WM. SCOTSON.
THOMAS BELL.

July 14, 1884.

MISCELLANEOUS IMPLEMENTS.

It will be obvious to those who know anything of the Implement Sheds in the Showyard that in the time which is at the disposal of the Judges it is impossible for them to inspect every article exhibited. The articles described as *New Implements* have their first attention, and it may be that some implements not so described may have deserved more notice than was accorded to them.

The following is a copy of the official award of the Judges:—

SILVER MEDAL: (1709) Burlingham, Innes and Paternoster, Stand 87. For new patent self-feeding motion attached to Article No. 1709, as an efficient safety-guard to the feeder of the machine.

SILVER MEDAL: (4606) Richard Hornsby and Sons, Limited, Stand 262. Plough marked L M. Fitted as a gripping plough with steel breasts.

Signed on behalf of the Judges,
July 16, 1884.

THOMAS BELL.

The Patent Self-feeding Safety Guard, attached to Messrs. Burlingham, Innes, and Co.'s Ensilage Cutter, has been already fully described in the notice of that machine in the Report of the trial of Ensilage Cutters and Elevators at page 10, and needs no further comment here.

The only other Silver Medal awarded was given to

Hornsby's New Patent Gripping Plough which is designed for surface-draining, and is constructed with 2 knives rising from the sides of the share, cutting the grip either V-shaped or with flat bottom, the sloping sides in either case keeping the ground from falling in. In advance of these knives, and in the centre of the grip, is fixed a skeith or wheel coulter dividing the slice into two parts, which are thrown out by the breasts, one on each side of the grip.

It can be adjusted to cut a grip from 4 to 9 inches deep, from 9 to 11 inches wide across the top, and $1\frac{1}{2}$ to 2 inches wide at the bottom or V-shaped as desired.

The soil taken from the grip is placed on each side, about 6 inches from the grip, convenient for being either carted away, thrown on the land, or left to be returned in the spring.

It is light in draught, being within the power of two horses.

The following illustrations show the two shapes of grips produced:—

Fig. 5.—View of Messrs. Hornsby's Gripping Plough.

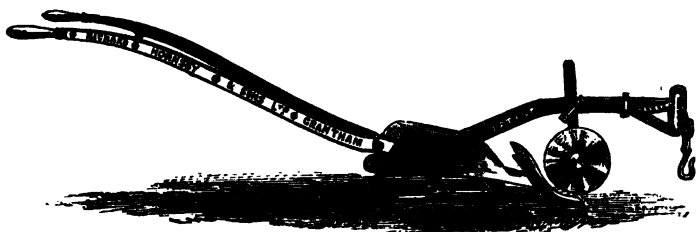


Fig. 6.—Section of Plough Furrows.



This grip is made with share marked L M 12 and V. slipe marked L M 14, bolted to the ordinary wrought iron slipe marked L M 16.

This grip is made with the share marked L M 9 for 1½ in. bottom or share marked L M 10 for 2 in. bottom and wrought iron slipe marked L M 16.

When the land is uneven or covered with rushes, the best work will be done by using the plough as a swing-plough; but when the land is level, for convenience and ease of management, it may be used as a one-wheel plough.

Its price as a swing-plough, with steel breasts, skeith, and knives complete, is 3*l.* 15*s.*; if fitted as a one-wheel plough, 5*s.* extra. This plough may be

converted into a ridging plough by the addition of the following parts: 2 steel ridging breasts, 2 hind breast stays, 1 front cap and 2 pins and bolt, and 1 mooter.

The gripping plough was tried by the Judges in the Show-yard, and, although the trial was by no means exhaustive, the work done was sufficient to prove the practical utility of the implement.

Messrs. Hornsby also exhibited a Chimney-Raising and Lowering Apparatus, attached to a portable steam engine. This consists of a rod or lever, made out of a piece of iron tube, and arranged to slide along sockets attached to the top of the chimney, so that it can be run out and used as a lever for raising and lowering the chimney, and at the same time, being permanently attached to the chimney, cannot be lost. When not being used, it can be slid along the chimney out of the way: it also thus forms a protection to the tarpaulin when placed over the engine when the chimney is hot. By its use there is no necessity for the engine attendant to get on the top of the boiler to raise or lower his chimney.

Another novelty on this Stand was a Folding Elevator Hinge Joint, on a hay and straw elevator.—This joint has been constructed so as to allow folding elevators to be folded without the necessity of getting to the top end to slack the screws that hold the chains, and it is effected by forming the joint with a sling link, which allows the top part of the trough to slide or swing over sufficiently to give the necessary slackness to the chains; and, at the same time, the joint can be held rigid when required to raise or lower the elevator, by inserting a pin in the bottom joint and a continuation of the above-named sling link. It is entirely automatic in action, and requires no attention on the part of the attendant.

Messrs. J. and F. Howard, of Bedford, exhibited two new Implements—a Self-acting Horse Rake and an Automatic Reaper—besides the two “Low-down” Sheaf Binders entered for trial. The delivery of the hay, collected by the horse-rake, is effected by bringing into action a brake, applied to the nave of the travelling wheels. The brake is now brought into contact with the inside of the nave, instead of the outside, as formerly. The price is 11*l.* 10*s.*

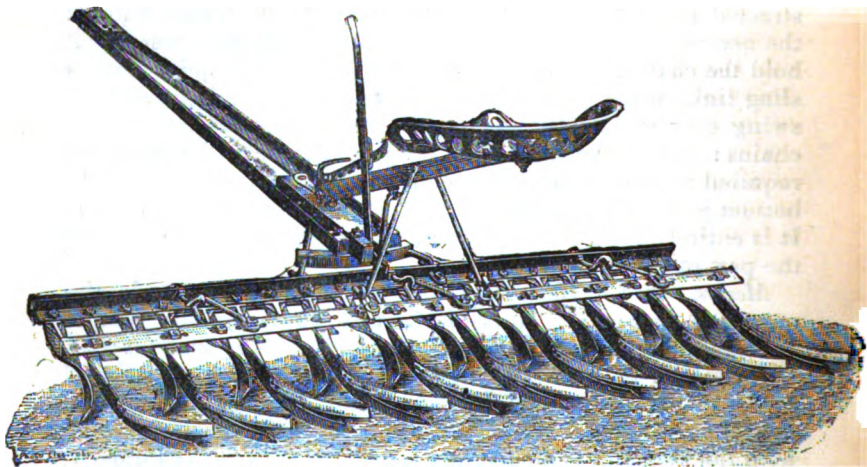
Mr. Edward Pratt, Albert Works, Uxbridge, exhibited a collection of Patent Wheels for mowers. The projections on these wheels, which prevent the machine slipping when at work, are cast in chills, rendering them intensely hard. They are said to last as long as the machines, and enable them to retain their cutting power. The price is 22*s.* each.

Messrs. W. N. Nicholson and Son, of the Trent Iron Works,

Newark-on-Trent, exhibited a powerful Bone Mill and Bone Duster. This mill has double steel segmental rollers, 16 in. wide, and two concaves with friction clutch. It was stated to be capable of reducing raw bones to $\frac{3}{4}$ in. and $\frac{1}{2}$ in. pieces, at the rate of 5 to 6 tons per hour, or to bone-dust and $\frac{1}{4}$ in. size at the rate of 3 tons per hour. The machine was worked in the presence of the Judges, and, during this short trial, did its work very effectively. A new Turnip Cutter was also on this Stand, price 4l. 10s. The angle knives, to cut finger-pieces for sheep, are arranged in spirals on a hollow plate-wheel, in a form which is stated to ensure continuous cutting and the least possible resistance from the roots, which are cut up to the last piece without waste.

The "Acme" Pulverizing Harrow, Clod Crusher, and Pulverizer, exhibited by *Messrs. Lankester and Co.*, is one of those implements, the merits of which can only be accurately known by trial. It is an American invention, and, as will be seen from the accompanying drawing, wholly unlike any British form of Harrow.

Fig. 7.—*Acme Pulverizing Harrow Clod-crusher and Leveller.*



"*Acme*" Pulverizing Harrow, Clod Crusher and Leveller.—As will be seen by reference to the illustration, an adjustable inclined levelling-bar and clod-crusher is provided, which is permanently attached to the pole. It consists of a strong bar of angle-iron to which are attached cast-steel crushing-spurs, the alternate ones being extended and curved in such a manner as to form the front coulter. These are not placed continuously on the bar, but at a little distance apart, which arrangement, while it in no way diminishes the efficacy as a crusher and leveller, tends to prevent clogging in damp sticky soil, and, furthermore, enables the driver to see what is being accomplished. Perhaps

a clearer idea of this part of the harrow would be given by saying that the crusher and leveller is simply an upward and forward extension of the front coulters, with a supplemental crushing spur thrown in between each pair of coulters. Being rigid, it does not conform to uneven surfaces, but, on the contrary (owing to the absence of yielding joints), tends to conform (level) uneven surfaces to itself, and serves to grind down the lumps.

To the rear of the crushing and levelling bar is hinged a tooth-bar, which is provided with another series of cast steel coulters-teeth, which are made of the best quality of cast steel (manufactured expressly for the purpose), are curved and bevelled to a sharp edge, are polished, and are set at an angle with the line of draft and also at an angle with the horizon.

Their peculiar form and the manner of their attachment to the implement, in double rows with reverse curves, secure a right and left, intersecting, uplifting under-cut, which ensures the cutting over of the entire surface of the ground, and at the same time lifts and turns the soil.

Thus the soil is subjected, first, to the action of the crusher and leveller; second, to the cutting, lifting, turning process of double rows of steel coulters.

A lever within reach of the driver, which is held in position by means of a ratchet, enables the operator to control the position of the crusher, and at the same time raise or depress the coulters to regulate the depth of work, so that any boy competent to manage a team can operate the harrow with ease.

Mr. Thomas Briggs, of Millstone Darwen, Lancashire, exhibited three Carts—one with the usual appliances of harvest-rails, etc., for agricultural purposes; another suitable for contractor or estate agent; and a light cart, for market purposes—all fitted with Briggs's Patent Noiseless Brake, which, the maker states, "takes all the weight off the horse's back and effectually applies the brake when going down hill, and, by reversing the same handle, puts an unlimited weight on the horse's back when going up hill without applying the brake." The Judges had the contractor's cart loaded with about 40 cwt. of stones, with a horse in the shafts. It was not possible to test the adjustment of the load by going up and down hill, but, by turning a small handle with one hand, the weight of the load was readily transferred from the back-band to the belly-band, or *vice versâ*. The power to make such an adjustment must be a great advantage in hilly districts. The price is 23*l.* 10*s.*

Messrs. Marshall and Co., of Leeds, Yorkshire, exhibited Twines for Sheaf-binding Machinery. Twine is manufactured to measure 700 feet to the lb., and the Judges found that it lifted over 200 lbs. The price is 3*l.* per cwt.

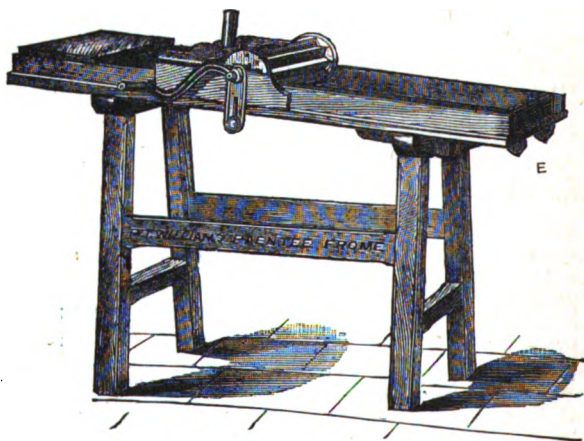
Messrs. George Llewellyn and Son, of the Churn Works, Haverfordwest, exhibited a Patent Triangular Revolving Churn. This churn is of a triangular or three-sided form, without dashers or any internal arrangement whatever, consequently easy to clean. The sides of the churn give sufficient concussion to the cream to make butter in the shortest time consistent with the greatest production. This churn was moved into the working dairy for

trial. Seven quarts of cream were put in, under Miss Smithard's supervision, and the temperature brought to 60 degrees. Butter came after working for 25 minutes, which was found to weigh $5\frac{1}{2}$ lbs. This was a small production, but doubts were expressed as to the quality of the cream. To churn 30 lbs. of butter, the price is 5*l*.

Mr. R. T. Williams, of Waterloo Farm, Frome, Somerset, showed a Combined Butter Worker and Dairy Table. This machine works the butter by a fluted roller. All parts can be easily detached, readily cleaned, and converted into a weighing, moulding, and general purpose dairy table. It has a box at the end to contain dairy tools, salt, etc., which, when closed, forms a stand for scales and weights.

The Combined Selwood Butter-Worker and Dairy-Table.—Figs. 8 and 9 represent the butter-worker. By turning the handle and gently pushing forward the travelling frame, the butter is worked into a fluted layer, and by bringing back the frame and reversing the handle, the butter is rolled up ready to be again passed under the roller. The centre of the roller being smaller than

Fig. 8.—*As a Butter Worker.*



the ends, the butter is higher in the middle than the sides, thus enabling any moisture on the upper surface to run off to the sides, where, owing to the fall given to the tray, it rapidly passes away into a pail placed for the purpose at the lower end of the table.

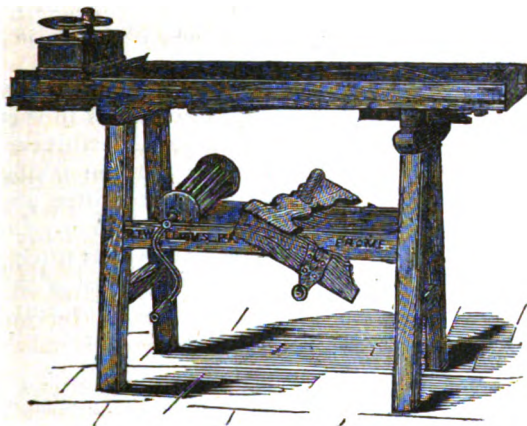
The springs are formed of india-rubber, which exert a soft and easy pressure, quite sufficient for extracting any butter-milk or moisture in the butter; but so gentle in its action that it does not destroy or bruise the grain of the butter, thus ensuring its keeping quality.

When the butter is properly worked and salted, by removing the springs, the roller and travelling frame can easily be separated and placed under the table as shown in Fig. 9. Then by raising the lower end of the tray about

three inches, at the same time pushing the knob, *e*, it is brought to a horizontal position, forming a strong, useful dairy table, for weighing and moulding the butter.

At the upper end is a box for holding the springs, dairy tools, &c., when

Fig. 9.—*As a Dairy Table.*



not in use; and by putting down the cover there is a place for the weights and scale (Fig. 9) whilst weighing, or for a board or dish to receive the butter when moulded. Price 4*l*.

Messrs. J. and F. Hall, of Worcester, exhibited Iron Fencing for Cattle (*Whitgrove's Patent*). The following description, will give a clear idea of its construction :—

The advantages of this fencing are its ornamental and massive appearance and great strength. All the horizontal bars are securely fixed by means of the patent couplings to the standards where they come in contact, instead of passing through the standards, consequently it is not liable to get out of shape as is usual with ordinary fencing, as every portion of the fencing has to take an equal strain. The standards can be placed at any distance apart, according to the strength of fencing required. The same principle applies to fencing with vertical bars and gates.

Patent Coupling Standards for Wire-fencing (Whitgrove's Patent).—These standards are so constructed that in fixing wire-fencing the wire can be strained first and the standards fixed afterwards, consequently saving a considerable time in fixing, as the wires have not to be threaded through the standards; and in case of broken standards they can be taken down for repairs without the wires. Price, with double-pronged feet, 3 feet 9 inch out of ground, 1½ inch by ½ inch, for 5 wires, 2*s*. each. Other sizes in proportion.

Mr. Wm. Brenton, of East Cornwall Iron Works, Polbathic, St. Germans, exhibited a Root Slicer, fitted with a revolving feed, which prevents the roots from choking in the bottom hopper: this is effected by metallic fingers revolving inside the hopper. Price 3*l*. 17*s*. 6*d*.

An assortment of Patent Belt Fasteners was also exhibited, which is well adapted for leather, cotton, or rubber belts. The fastener will allow the belt to work freely on flange pulleys and through the guide forks for fast and loose pulleys, as it has very little projection in the surface and none at the side of the belt. It is strongly recommended for its strength and safety. The lock-pin cannot come out when the belt is working. Price from 4d. to 1s.

Messrs. Carson and Toone, of Warminster, Wilts, exhibited a collection of Implements for Saving Grain Crops in Wet Seasons. This collection at least proved how much the exhibitors were in sympathy with arable farmers during the late trying seasons. It consisted of shelterer, decapitator, barley-lifter, seed and ear storer, &c. The Judges were unable to obtain any information as to the cost of saving an acre of wheat by this process. Until it has been subjected to a field trial they must withhold their opinion. The same firm showed a new Horizontal Water-Wheel, of which the following is a description:—

Carson and Toone's New Horizontal Water-wheel, with Automatically Opening and Closing Floats.—The above is entirely self-contained, and fitted with a driving pulley, 16 inches by 2½ inches; it is so constructed that it can be dropped into the bed of a stream, and ready for work with a trifling cost of a few shillings only.

The floats are so arranged that they open and close automatically with the revolutions of the wheel and the flow of the water, offering when on one side of the wheel no resistance whatever, but when on the other side gathering in the maximum of power.

The design is simple, and it is labour-saving in various ways; by utilising the flow of ordinary streams of a few inches in depth, it can be easily applied to such work as chaff-cutting, pulping, pumping, &c. Price 6l. 10s.

The above size measures 3 feet in diameter by 2 feet high, but it can be increased at a trifling cost to suit different requirements.

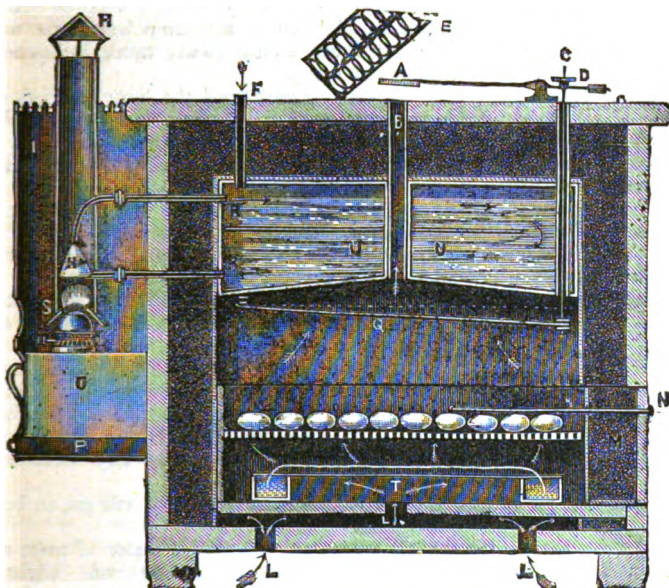
Messrs. Thomas Christy and Co., of 155, Fenchurch Street, London, exhibited numerous Machines for Hatching and Rearing Chicken and Ducklings. "The Thermostatic Incubator" was clearly outside the possibility of trial by the Judges. On some farms there is occasionally great difficulty in obtaining "sitting hens" for hatching early spring chicken. These foster-mothers may in such cases be of service, if they receive the necessary attention.

Description and Working Instructions.—This improved incubator consists of an iron water-tank, acted upon and kept hot by a miniature boiler, connected with it by two copper pipes *n*. By the lower of these pipes the water escapes from the tank into the boiler, whence, after being subjected to the heat from a lamp below, it passes by the upper pipe back again into the main tank, and radiates its heat downwards upon the eggs, kept in a drawer below it.

To ensure the necessary regularity of temperature in the egg-drawer, the

bottom of the water-tank converges upwards towards the centre, and is there pierced by an air shaft B carried up through the tank, and the packing and wooden casing, enclosing the tank. In the air chamber between the tank and the egg-drawer is fitted a patent thermostatic band of two metals of unequal expansion Q, on the same principle as is employed in a compensated watch. This band is acted upon by the heat passing over the eggs, and it controls (through a lever connected with it by a rod c, passed down a small

Fig. 10.—Sectional View of Patent Thermostatic Incubator.



A, valve acting upon B, the mouth of air shaft.
C, rod connecting valve with the thermostatic band in the egg-drawer.
D, the set screw for regulating the temperature.
E, the screen protecting the valve A and the lever.
F, is the filling pipe.
G, is the pipe down which the thermometer to test the water is dipped.
H, the cowl of the chimney, now discarded as useless.
I, is the circulating boiler in the centre of the chimney.

I, lamp screen and stand.
K, the egg-tester.
L are the air-holes.
M, the front of the drawer.
N, the thermometer.
O, the lamp.
P, the wood slide to push lamp close up into the chimney.
Q, the thermostatic band—when cold it follows the dotted line, when working it is pressed down at end attached to C by its own expansion.
R, R, circulating pipes.
S, collar fitted at bottom of H.
T, evaporating pan, covered by canvas.
U, water tank.

pipe inserted through the water tank) a valve A fitted upon the top of the air-shaft. The object is twofold:—first to ensure a regular temperature above the eggs, and secondly to produce a perfect system of ventilation in the egg-drawer.

If the temperature in the egg-drawer rises, the metal band at once feels the effect, and draws down the rod attached to it, and thereby opens the valve, allowing more of the hottest air to escape, and preventing too great a rise of temperature. The reverse holds good of a falling temperature, and the valve is no sooner shut than the heat begins to rise again.

As regards ventilation:—air penetrates into the egg-drawer through holes bored in the bottom of the wooden casing at *z* and in the false bottom, and is evenly distributed throughout the egg-drawer. The shape of the bottom of the tank, besides aiding the working of the thermostatic band, also serves to equalise the heat all over the drawer, so that changing the position of the eggs is quite unnecessary. The lamp kept always burning to heat the circulating boiler is fitted in a metal chimney, which closely encircles the boiler. At the bottom is fixed a broad convex collar *s*, pierced so as just to allow space for the flame, letting as little air up through this aperture as possible. This collar extends beyond the chimney, forming a flange outside, and forcing the air through the small holes in the lamp below the wick, aiding a perfect combustion and making a clear steady flame, independent of draughts, and burning without any smell.

Both the lamp fixed on at the side (or back) and the lever and valve on the top of the incubator are protected by metal screens or covers *x* and *y*.^{*} A thermometer *n*, to show the temperature over the eggs, is fixed on the front of the drawer. A second thermometer serves as an index of the heat of the water at the bottom of the water tank, through the tube *g*.

The necessary moisture for the eggs is provided by the vessel *t*, which fits round and underneath the egg-drawer. The space between the sides of this water vessel is covered by coarse canvas, the ends dipping into the water all round. By capillary attraction the canvas is thus kept wet, and the incoming air as it passes through it absorbs the necessary degree of moisture. A piece of felt or flannel is placed on the false bottom on which the eggs rest.

Rules of Working.—1. The machine unpacked, stand in its place, leaving a foot to two feet of clear space all round and under it. Screw on the boiler and chimney as tight as possible with the fingers, and button on the lamp screen. If after filling with water the brass unions drip, proceed cautiously to tighten them with a spanner, but on no account use any violence, or serious damage may be done.

2. Turn the set screw (or head screw) *d* as high as it will go, or, better still, remove it temporarily altogether.

3. Fill the tank with boiling water, or with colder water if more convenient. For a 100-egg machine, seven gallons will be required. Light the lamp, turning up the flame to its full power, until the machine gets heated through.

4. Leave it like this for some hours, or all night, the valve *a* being down. Fill the water tray.

5. If boiling water has been used, after a few hours the heat in the drawer will be found about 108° or 110°. If cold water be used, it will be necessary to keep the valve down until the lamp has raised the heat of the water sufficiently to produce a temperature of 108° or 110° in the egg-drawer.

6. Put the set screw *d* on and open the valve wide, letting off the heat until it is down to 102° or so. Then, by means of the set screw, adjust the valve so that it just touches the aperture. Ascertain now, by means of the long glass thermometer, the heat of the water at the bottom of the tank *a*, which for a 100-egg size generally requires to be kept about 170°. Record these on the register.

7. Leave for an hour, then look at drawer thermometer, and dip the other one carefully to the bottom of the pipe *g*, to see the heat of the water. The drawer heat will now be a degree or two higher, and the eggs can be put in.

8. The regulation will now go on of itself. Suppose you wish for a higher temperature in the egg-drawer, lower the valve (by turning the set-screw)

^{*} Except in the small-sized metal-cased Incubators.

one-eighth of an inch for every degree wanted. If a lower temperature is desired, raise the valve a trifle.

9. Trim and cut the wick of the lamp every twelve or eighteen hours. Always remove the wood slide on which the lamp rests, before trying to take the lamp away, and the tighter a lamp fits up into the chimney, the better it will burn. Remember never to quite fill the oil reservoir. Cut the wick level, just shaving off the extreme sharpness of the corners. What is required is a broad flat flame reaching almost from side to side of the lamp chimney. If the least point or horn of flame appears when turned up, the lamp is not properly trimmed. No part of the flame must ever touch the boiler. After burning a few minutes, the flame of oil lamps increases slightly, therefore never turn to the highest possible point, or the slightest rise will put the flame against the boiler and cause smoke.*

10. Turn the eggs twice a day for the first ten days, afterwards once only is necessary, and always turn them before trimming the lamp. When turning in the morning, cool the eggs for five or ten minutes. Keep the heat in the egg-drawer as near 104° as possible.

11. Replenish the water tray under the egg-drawer with just warm water (80°) about every other day, and at the same time fill up the main tank at *r* till it overflows.

12. For the lamp, use good paraffin, kerosene, or crystal oil, and wipe dry and clean each time after trimming the wick.

13. To empty the machine of water, undo the screw cap at bottom, or turn the machine over on its side.

14. If it is desired to detach the lamp chimney at any time, lay the incubator on its side and undo the unions.

15. The bulb of thermometer must be on the level of the top of the eggs, or you must make an allowance. For instance, if with a thermometer at the ordinary level ($1\frac{1}{2}$ inches from the floor of the drawer) you put in pheasant's eggs, you must work at 106° to 108° to give 104° on the top of the pheasant's eggs.

16. The thermostatic band *q* acts from the dotted line (see sectional drawing) downwards. See when starting that *c* protrudes about an inch above the lever, else *q* must be bent by placing the fingers of both hands above the broad band *q*, and pressing it upwards with both thumbs. If you bend up the band, such bending must be done at the back. The band itself should be kept straight from where it joins the rod *c* to the other end, where the bend is. Price, for 100 eggs, 8*l.*; for 50 eggs, 6*l.*

Mr. John Myatt, Berryhill, Stone, Staffordshire, exhibited a Sheep-Dipping Apparatus, with a Drainer on an entirely novel principle. The dipping-tub is of the ordinary shape, with a sloping end for the sheep to walk out on to the drainer. The drainer is circular-shaped, and divided into six compartments; each compartment drains into a grated pipe in the centre of the drainer, which conveys the liquid back to the tub. The drainer is made to revolve, and each sheep as it comes round to the place of exit, which is placed immediately behind the place of entry, is sufficiently dry to be allowed to go. The table requires to be placed level. There may be some question as to the movement of the sheep interfering with the equilibrium, but this could only be ascertained by experiment. The price is 12*l.* 12*s.*

* All the Patent Thermostatic Incubators can be worked by gas, if preferred.

Messrs. Edwd. Thomas and Co., Oswestry, exhibited a Sheep-Feeder, made entirely of galvanised iron, which is a Corn-Bin and Sheep-Trough combined. The bin holds six bushels of feed (which may be secured by padlock), and is supplied with a measure for dealing out the specified daily allowance. The trough is divided into compartments, and, being circular, twelve sheep can comfortably feed at a time. The wheel in front is for the purpose of moving into fresh ground, so that the land may be more evenly managed. Their Cattle and Colt Feeder is strongly built up of angle and galvanized iron, of an entirely new design. The racks and mangers are so arranged that, in feeding, animals do not interfere with one another.

Mr. Francis Walker, of Tithby, Bingham, Nottinghamshire, exhibited a New Drill, 12-row, General Purpose, for depositing all kinds of Corn and Seed, with or without manure. It was entered in the catalogue "*for trial*." The exhibitor claimed for this drill that it would sow damp artificial manure evenly. The Judges obtained a bag of Odams's superphosphate, had it slightly damped, then placed in the drill, which was worked up and down the avenue. It was found that the manure was deposited very irregularly. This was no doubt owing to the manure being damped.

Messrs. Barford and Perkins, Peterborough, exhibited a Patent "Lifter" for raising and lowering the Chimneys of Portable Engines. It is applicable to any portable engine. The apparatus consists of a socket-fixer on the front of the chimney, into which an iron lever fits. By inserting the lever into the socket, one man can easily raise or lower the chimney in a few seconds. The lever serves as an ordinary crowbar. The price for engines of 4 to 6 H.P. is 2*l.* 5*s.*; for engines of 7 to 10 H.P., 2*l.* 10*s.*

The Albion Iron Works Co., Rugely, exhibited a Horse Gear for two horses. The special feature of the gear is the large dimensions of the driving-wheel, which is made in two parts; the centre being separate from the outer ring or teeth, and in case of breakage the latter can be easily renewed. The gear is supplied with a new patent safety ratchet; it is attached to the pole-cap and main spindle. The action of the ratchet is immediate, and prevents the poles from striking against the horses should they stop short. The price is 14*l.* 15*s.*

Several well-known makers of Traction Engines exhibited Spring Engines, for which considerable credit is no doubt due to the inventors; but the Judges agreed that it was impossible to give an opinion of the relative merits of the several "spring engines" in the Showyard without an exhaustive trial, which it was impracticable to attempt at the present meeting.

Messrs. James Braby, of Maybank, Rudgwick, Sussex, exhibited

a light Agricultural Traction Engine or Locomotive, said to be of an entirely new construction, of three-horse-power nominal, but capable of indicating a much higher power. It weighs a little over a ton and a half when filled with water and coal supply. The speed at which it is intended to travel is three miles an hour, but by altering the gearing seven or eight miles an hour can be attained when the engine is being used in countries where the speed of traction engines is not restricted.

It can be used as a traction power for drawing loads on common roads; and by simply throwing the traction out of gear it can also be used as a stationary engine for pumping, grinding, threshing, chaff-cutting, &c., where an ordinary engine of that power is suitable.

There is also a spare wheel exhibited, which has a groove in the tire. This is a substitute for the common road wheel when it is desired to use the engine on a single tram-rail, by disconnecting the steerage apparatus.

It can further be used to travel round a circle for working a pug mill in a brickfield or other similar work.

Novelty of invention is claimed for—

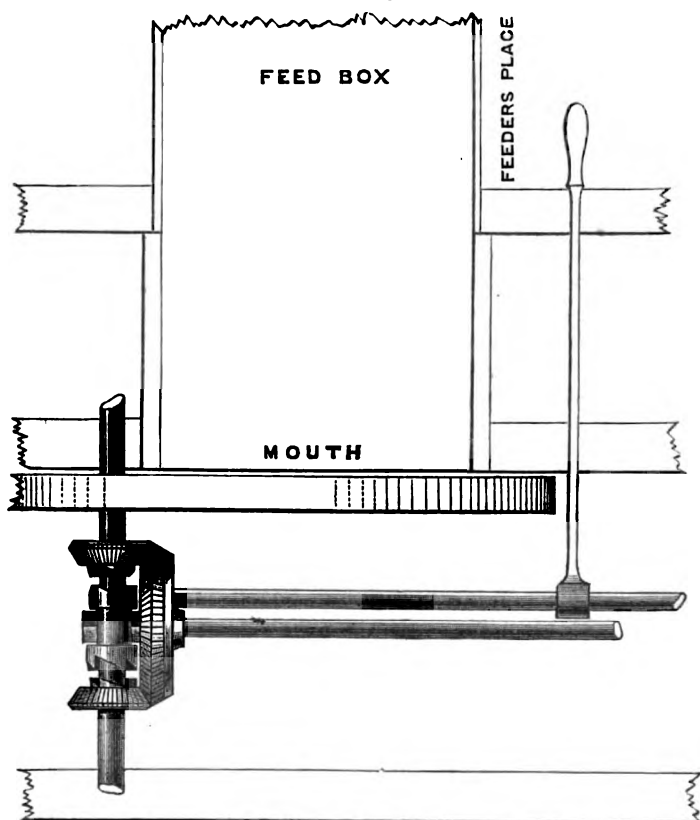
- 1st. Converting the central steering wheel of traction and locomotive engines into a driving wheel.
- 2nd. Mounting the central steering wheel of traction and locomotive engines on a radius axle, and transmitting to such wheel driving power through the pivot on which the radius axle turns.

This engine was moved about in the yard for inspection by the Judges. The front driving wheel did not appear to be sufficiently weighted to draw a load or to take the engine alone through a soft part of the yard, but where the ground was hard the engine travelled well. The price is 170*l*.

Messrs. R. A. Lister and Co., Victoria Iron Works, Dursley, exhibited Grinding Mills of various sizes, said to be of an entirely new design. They were fitted with French burr stones, varying in size from 30 inches diameter to half that size. These stones run vertically on a horizontal spindle. The mills are self-contained on a strong iron framing constructed with a view to easy erection and management. They are suitable for cracking, kibbling, or grinding grain or seeds into meal (see Fig. 11, p. 32). The work they did in the presence of the Judges was very satisfactory.

Messrs. Gibbons and Robinson, Wantage, Berkshire, exhibited a Finishing Threshing Machine, fitted with a New Patent Single Crank Shaft, which materially reduces the number of wearing parts. During the short trial to which this machine was subjected in the Showyard the work was done very effec-

Fig. 11.—*Feeding Box and Gear of Messrs. R. and A. Lister and Co.'s Seed-crushing Mill.*



tively. The following is a technical description of these new parts, with their attachments :—

This machine has five shakers carried by cast iron brackets on the crank as is usual in "Good's system," and at the ends of the shakers which require supporting, and which are usually supported by rockers, these brackets have spring blades of wood fixed to them, which blades are then led and fixed, three to the bottom shoe or riddle, and two to the top shoe of the machine; thus motion is imparted to the shoes which now take the place of rocker supports at the tied ends of the shakers, and as the shaker ends are tied by spring blades, a peculiar springiness of action is given them, which greatly adds to their efficiency; and by the resistance of the spring blades to the centrifugal force of the shakers when at their highest point the tendency to wear the crank dips on the inside is greatly reduced. Both the top and bottom shoes of this machine are carried on spring hangers without pin joints in the usual manner, but the momentum of the shoes is largely taken up by eight spring blades of wood, which are fixed at their lower ends to the hind axle

bed of the machine in two sets; one set of four on one side of the axle bed being worked by one connecting rod and joint from the top shoe, and another set of four springs on the other side of the axle bed being worked by the same means from the bottom shoe; thus eight springs are worked by two joints only, and possess various advantages, some of which are as follows: Their pull being equal and counteracting, the axle-bed remains unaffected, they act as guides for the shoes; they place no strain on the frame of the machine, as they do not support the shoes; their action through dead weight being always on them does not deteriorate, and if breakage occurred, no harm would happen; by their application the single-crank system can be applied to machines of greater width than 4 feet 6 inches, as any required resistance to the momentum of the shoes can be obtained. In the machine as it stands, 18 bearings and joints requiring oil are done away with, while the efficiency of the shakers is greatly increased, and as their weight is much reduced, and as the riddles or shoes are controlled by powerful momentum springs, the power consumed in driving is much less than in the ordinary threshing-machine.

Mr. Charles Perkin, Sharston, Northenden, Manchester, exhibited a Hay-Purifying Apparatus. This consisted of a set of steam-pipes to be inserted horizontally at equal distances from each other in the stack to be operated on. These pipes are connected with an ordinary steam-boiler, and a certain pressure of steam is thus forced into the stack. This treatment is said to materially improve musty or mildewed hay. The price is 6*l*.

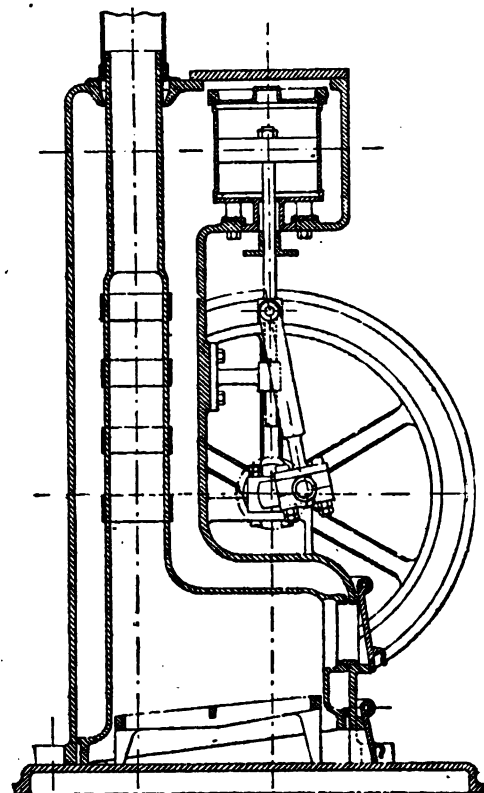
Messrs. Corbett and Son, Park Street Works, Wellington, Shropshire, exhibited a Chaff-Cutter and Root-Pulper combined. The two machines are mounted on a frame a given height above the ground-floor. An elevator is attached to the hopper into which the roots are thrown, and these are carried by it into the pulper. The pulper and chaff-cutter are worked simultaneously, and the materials are delivered into spouts and dropped on to the floor, mixed in such proportions as the feeders desire.

Messrs. Hawthorn, Davey and Co., of Sun Foundry, Leeds, Yorkshire, exhibited three small Engines, which they designate "Domestic Motors." They are chiefly adapted for pumping water, but can be used for driving machinery. They occupy very little space, are neat and compact, and well finished. The accompanying description and illustrations are taken from the 'Engineer':—

The three engines exhibited are rated by the makers at $\frac{1}{2}$, $\frac{1}{3}$, and 1 horse-power respectively, and are all of the same general design, this design being shown by illustrations on pp. 34 and 35. Referring to Figs. 12 and 13 there given, it will be seen that the arrangement consists of a cast-iron boiler containing a cast-iron firebox with uptake, this uptake, which is of rectangular section, being traversed by rows of wrought-iron tubes. The firebox and uptake are cast in one piece, and are connected to the outer shell by cement joints caulked into the socket spaces left to receive them at top and bottom as shown, the joint at the fire-hole being made by a ring coated with red-lead and driven in. The upper part of the boiler is extended to contain the steam cylinder, which is made of gun-metal and fitted with a slide valve in the ordinary way.

There is no valve chest, however, the cylinder with its valve being directly surrounded by the boiler steam, while a throttle valve placed on the exhaust affords the means of stopping and starting. Of course the cylinder is by this arrangement most effectively steam-jacketed. The piston is coupled by a connecting rod in the usual way to a crankshaft supported by bearings which are mounted on brackets cast in one with the boiler, as shown. The crank-

Fig. 12.—*Longitudinal Section of Messrs. Hawthorn, Davey and Co.'s Domestic Motor.*

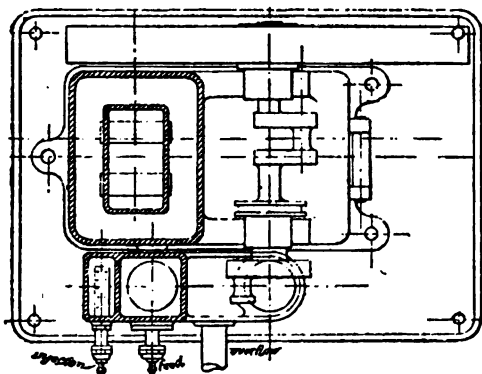


shaft is provided with an eccentric for actuating the slide valve in the usual way, while at one end it carries a flywheel and at the other a disc crank for driving the air-pump. When the engine is used for pumping purposes, the pump is mounted on the bed-plate and driven from a crank-pin in the fly-wheel.

By the side of the boiler is another casting, forming the condenser, the feed-chamber, and the hot-well. In the connection between the cylinder and the condenser is fitted the throttle valve we have already referred to. The condenser is provided with an ordinary jet injector. The air-pump is single-acting and is fitted with a plunger, not having any packing. When

near the bottom of its stroke, however, it uncovers a small hole which allows water from the hot-well to flow back into the plunger and over its edges, thus forming a water seal. At the high speed at which these engines are run, a plunger, wholly submerged, would splash the water about too much; but the contrivance we have just described avoids this trouble, and serves the same purpose of making a water-joint. In the engines exhibited the air-pumps are fitted with metal valves, the suction valve having a stem which projects through a bar on the delivery valve, and is furnished with a collar. By this arrangement the two valves are linked together, and as the outside diameter of the suction valve is slightly less than that of the hole which the delivery valve covers, the two valves can, when the vacuum is destroyed, be easily lifted out together by taking hold of a ring.

Fig. 13.—Plan of Messrs. Hawthorn, Davey and Co.'s Domestic Motor.



The boiler is fed from a closed feed chamber which is cast on the side of the condenser above the hot-well. This chamber is in free communication with the boiler by two passages, namely, a large one leading into the steam space, and a small one leading to the boiler below the water line. The water thus stands in the feed-chamber at the same level as in the boiler. The feed-water is brought to the feed-chamber by a flexible pipe attached to the cock, which has a nozzle projecting into the feed-chamber, the nozzle being fitted with a plug and float. If the water-level falls, the float of course falls with it, thus lowering the plug and admitting more water to the boiler until the proper level is restored. In the case of the engines at Shrewsbury this arrangement worked admirably, the water-level being maintained with great steadiness, notwithstanding that there was a great fluctuation in the pressure in the mains from which the supply was drawn.

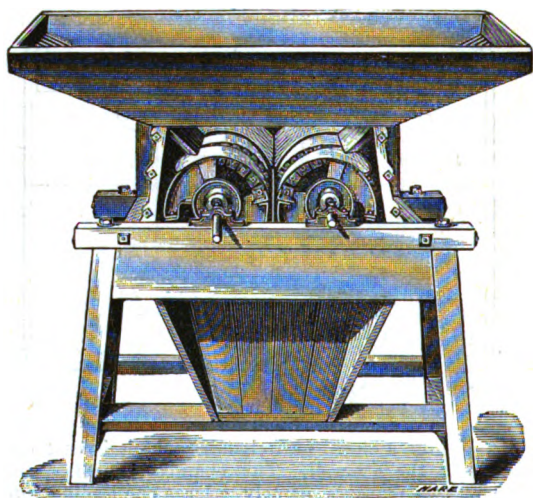
The boiler is provided with a loose cover or large valve at the top, and when starting the engine steam is got up until it blows through this valve and expels the air from the boiler. The engine being then turned round and the condenser blown through, a partial vacuum is formed on the injection being turned on, and the engine works just like an ordinary condensing engine. In practice the engine does best if the steam is kept just below blowing-off point or practically at atmospheric pressure, as there is then no tendency for air to leak in at the stuffing-boxes of the piston-rod and valve-spindle, even if these are but slackly packed. The engine will, however, work perfectly well with

several inches of vacuum in the boiler, the amount of vacuum permissible of course depending upon the load. In the condenser the vacuum obtained is 25 inches to 26 inches. The consumption of gas coke is stated to be about 6 lb. per indicated horse-power per hour, and the cost of working is thus exceedingly small.

Messrs. Samuelson and Co., Banbury, exhibited a patent Twin-Barrel Turnip-Cutter for power.

In the illustration which the makers are good enough to furnish, the side is removed to bring the barrels into view. The pulley is fitted on to the longer of the two spindles shown

Fig. 14.—*Samuelson & Baker's Patent Twin Barrel Turnip-Cutter.*



in the figure; on the other end of the spindle (hidden by the machine) is fixed a spur-wheel, which works into another spur-wheel of exactly similar pattern, fitted upon the spindle belonging to the other barrel: the two barrels are so set that the knives come into work simultaneously in both of them, and the turnip is cut on both sides at the same time. The price is 10*l.* 10*s.*

Messrs. Ransomes, Sims, and Jefferies, Limited, Orwell Works, Ipswich, had several "New Implements" on exhibition, especially the following:—

New Light Double-action Haymaker, fitted with hood.—The peculiarities of this machine are that its tines are alternately straight and hooked, to suit it for doing equally well the forward (or overhead) and the backward (or tedding) actions. There are six rows of tines, five in a row, on each head, and the hooked and straight tines are set alternately so that anything that

may be missed by the one is taken up by the other, which immediately follows it. The machine is easily thrown in and out of gear by levers easily accessible at the sides of the machine. It is also fitted with a seat on the outside of the axle at the off-side, by which the rider is able to guide the horse and yet is out of the way of the hay as it is thrown over. In this position the weight is entirely taken off the horse's back. In going from field to field this seat can be taken out and placed in a socket in front of the machine, which reduces the width for going through gateways, &c. The tines can be adjusted to suit the variations of the crop by a "cart-tip" action in front of the machine. It is also sometimes fitted with wheel-guards, to prevent the hay being thrown into the machine and clogging it in very stormy weather.

New Light Back-action Haymaker.—This machine has a solid through axle. The gearing is carried in a wrought-iron box in the middle of the machine, so that clogging is impossible, and, by using the back-action only, the seeds are not knocked out of the hay. It is of sufficient width to take two swathes of the mowing machine.

New Large Self-acting Rake.—This is an implement with wheels 54 inches high. The wheels are fitted with ratchets which are separate from the wheels themselves, so that they can be replaced when worn. The wheels are also fitted with bushes, so that they can be renewed at a trifling expense. The ratchets already referred to are actuated by the foot of the driver when riding, or by a handle behind when walking, and the teeth are immediately lifted by the horse. Another advantage is that the teeth can be held up in position for turning round in the field by keeping the foot on the treadle, or, when going from field to field, by putting in a sliding bolt which completely locks them.

The teeth can be adjusted to the ground by a segmental arrangement on the shafts. The teeth are held in their places by a new arrangement; each tooth fits into a separate socket, and the end of the tooth is cut away and turned up, so that it is hooked into the socket and is held by a loop and nut placed in the socket. This keeps them firmly in their places; at the same time any tooth can be taken out in a moment. The rake can be managed by any boy who can be trusted to drive a horse.

The Model Telfer Line, exhibited by Mr. Fleeming Jenkin, F.R.S., of 3, Great Stuart Street, Edinburgh, was a decided novelty. The stand where it was exhibited in motion was always thronged with visitors.

It was officially described as a "model of an aerial rope or rod-way for the conveyance of goods in parcels of from 1 cwt. to 4 cwt., driven by an electric current. Weight of train, 10 cwt. to 30 cwt. Speed, about 4 miles an hour; gradients, those of ordinary occupation roads; working, requires no guard or driver with the train." There was also exhibited a Span and Train of full-sized Telfer line, manufactured by the Telferage Company. An intelligible description of how this is done could only be given by an expert. Suffice it to say, that it is a distinctly new departure in the conveyance of farm goods.

The exhibition of Silos was a novel and highly interesting feature of the Showyard. In the Report of Mr. Jenkins, "On the Practice of Ensilage at Home and Abroad," which is to be

found in the last volume of this 'Journal,' the whole subject of Ensilage is dealt with in such an exhaustive and explicit manner that it only remains for me to name the exhibitors and their respective exhibits; their whole system of buildings, method of weighting, &c., having been fully described in the Report referred to.

Messrs. W. H. Lascelles and Co., 121, Bunhill Row, London, exhibited their Silo-Portable, made of timber framing and concrete slabs. The week previous to the opening of the Show this silo, under the superintendence of Mr. Kaines Jackson, had been filled with green clover, unchaffed, and weighted with loose sand. The silo was opened on Monday afternoon, so that visitors might inspect the silage, which, to all appearance, was in process of being well preserved. The price of this silo was 16*l*.

Mr. S. H. Stocks, Whitecliffes, Cleckheaton, Yorkshire, exhibited a Portable Wooden Silo and Press. The dimensions were 20 ft. by 11 ft. by 12 ft. Capacity, 53 tons. Price, 58*l*. The construction of Mr. Stocks's silo, with the mode of pressing the material, is fully described at page 201 in the volume containing Mr. Jenkins's Report.

Messrs. F. W. Reynolds and Co., Acorn Works, Blackfriars, London, S.E., had three Patent Portable Silos on exhibition. Messrs. Reynolds' arrangements for the mechanical compression of fodder in silos has been fully described in the Report by Mr. Jenkins. It may, however, be of advantage to give the following description of the portable silos exhibited :—

Patent Wooden Portable Silo.—It consists of wooden boards planed on the inside and edges to suit the radius of the required circle, and tongued with hoop iron. These boards are erected vertically, like staves of a barrel, and are held together on the outside by iron bands, which are tightened up by lugs and screws, the bands being in sections. Some of the staves are supplied with staples in which the bands rest before they are tightened. These staves are erected first, and after the bands are placed in position, the remaining staves are put in a circle inside the bands, and the whole drawn together by means of the screws. A door is supplied to facilitate the removal of the silage. When the sides of the silo are sufficiently tightened, they become both air and water tight, but the outside should have a coat of tar to protect it from the weather, and the inside may be charred with a torch. After erection, the floor should be raised a few inches above the surrounding ground to keep it dry; it may be made of concrete, puddled clay, or it may be paved with wood or stone. The roof consists of a cross-beam of timber, with a timber upright in the middle, the whole being covered with rot-proof and water-tight canvas fastened down to the sides of the silo by a band drawn together with a screw. When erected, this silo is practically air and water tight throughout, the joints of the door being luted with clay. Its strength in sustaining lateral pressure is very great, the circular form being the best adapted to resist internal pressure, and to contain more silage for the same amount of wall than any other shape. This form is also more suitable than any other for allowing the silage to sink, as there is less friction where there are no corners. Any means

of compression may be used with this silo, but the exhibitors' patent chain appliances are said to be particularly suited for it, as they can be anchored in the ground, and are entirely independent of the walls.

One of these silos had been filled on July 7th and 8th with $1\frac{1}{2}$ acres of unchaffed grass. On Friday, the 11th of July, it was again refilled with the chaffed grass, which was cut up by the ensilage-cutters in the trial-field. It was estimated that there was altogether about 16 tons of grass, which was compressed from 9 feet in depth to 3 feet, with 2 beams equalising 16 tons of pressure. Instead of the ordinary wooden door, a plate-glass door, 30 inches by 20 inches, was inserted, and it was thought to have proved pretty conclusively that there had been little or no lateral pressure. On the 15th of July, the Judges procured from the stand of Mr. Charles Clay, of the Stennard Works, Wakefield, one of Clay's Patent Stack Thermometers, for the purpose of testing the temperature of the silo at various depths. This simple but most useful instrument was readily inserted vertically into the centre of the silage. At a depth of 6 inches from the bottom the temperature was found to be 86 degrees; this was amongst the unchaffed material which had been in the silo for eight days. At a depth of 15 inches from the top, where the chaffed material had been in the silo for five days, the temperature was 118 degrees. The silo was opened before the close of the Show, when the chaffed and unchaffed fodder were found to be in equally good condition.

The Working Dairy, which at Shrewsbury properly occupied a prominent position in the centre of the Showyard, has apparently lost none of its interest to the general public, judging from the crowds that generally occupied all the standing room where a peep at the work going on was at all possible. Although this is now a well-known feature of the annual Country Meetings of the Society, yet any report of the Implement Department that failed to give a somewhat full account of the proceedings at the Working Dairy would be lacking in justice to an Exhibition which has awakened an increasing interest in the important industry of dairy farming, which is now generally allowed to be one of the most profitable of all agricultural pursuits.

The special object of this dairy is to give practical illustrations of the French and the Danish methods of butter-making. I cannot in any way so well describe how this was done than by making copious extracts from the carefully-prepared 'Descriptive Guide to the Working Dairy,' which Mr. Jenkins, with his usual forethought, had compiled and placed for sale to visitors at 2d. each.

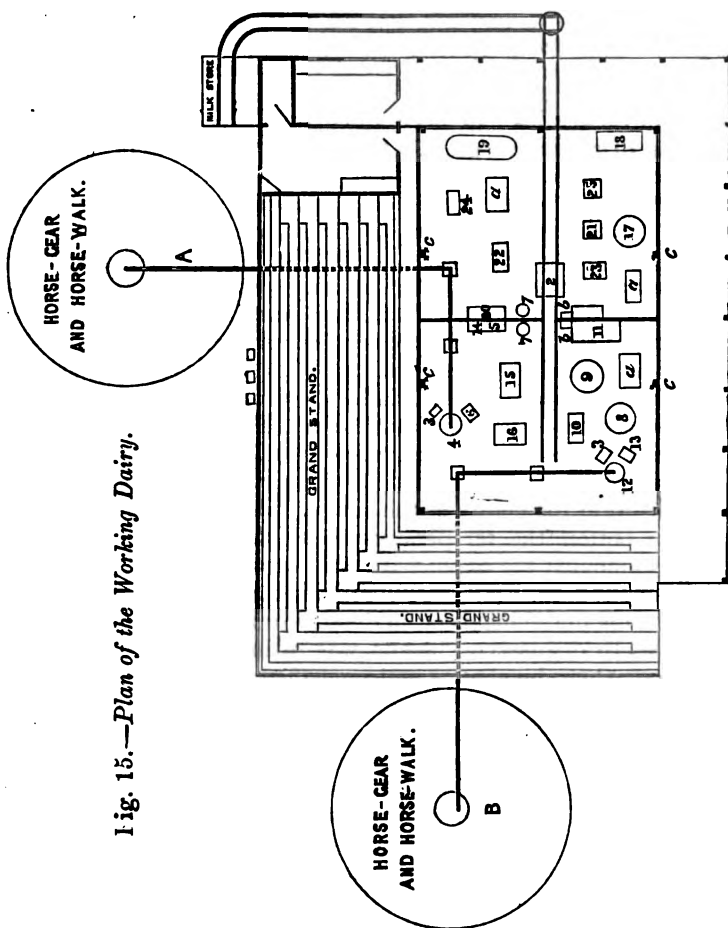


Fig. 15.—Plan of the Working Dairy.

REFERENCE TO PLAN.

1. Barford and Perkins's Steam-boiling Pans.
2. Avery's Platform Weighing Machine.
3. Lewis's Milk-can Lifter.
4. Nielsen and Petersen's Separator.
5. Lawrence's Refrigerator.
6. Lawrence's Heating and Cooling Apparatus, to be worked with a Separator.
7. Ahlborn's Cream-casks.
8. Ahlborn's Holstein Churn.
9. Ahlborn's Butter-worker.
10. Ahlborn's Butter Trough.
11. R. A. S. E. Danish Hardening Boxes.
12. Laval's Separator.
13. Dr. Bond's Siphon-tank and Refrigerator.
14. Lawrence's Milk-heating Apparatus.
15. Bradford's Diaphragm Churn.
16. Bradford's Albany Butter-worker.
17. Bradford's "Springfield Butter-worker."
18. Swartz Cooling Vat and Milk-pans.
19. Bradford's Milk-pan Stand and Setting Pans.
20. Lawrence's Refrigerator.
21. Taylor's Eccentric Churn.
22. Bradford's Small Diaphragm Churn.
23. Swing Churn.
24. Bradford's "Albany" Butter-worker.
25. Ahlborn's small Butter-kneader.
- a, a, a. Tables.
- b, b. Decks and Racks.
- c, c, c. Water-taps.

The plan on p. 40 indicates the machines worked in the dairy, and also illustrates their relative positions.

The materials employed in the construction of the building were similar to those which were used for the same purpose at the York Meeting in 1883, and which have been clearly described by Mr. Coleman. The York Dairy differed, however, from that at Shrewsbury, because the former was chiefly worked by steam-power, and the latter only by horse- or hand-power.

The programme for each day the Show was open to the public was as follows:—

9 A.M. to 11 A.M.—Dairy open for the inspection of Implements used.

11.30 A.M. to 1 P.M.—Separators at work in the Horse-power Dairy, and Butter made on the French and Danish systems.

2 P.M. to 3 P.M.—Skimming and Butter-making in the small Dairy.

4 P.M. to 5 P.M.—Dairy open for the Inspection of Implements used.

The head dairy-woman (Miss Smithard), while carrying out and superintending the operations of cream-separating and butter-making in the small dairy, gave a lecture each day on the subjects that were being illustrated.

Mr. Jenkins's description of the various operations and the machinery used is so clear and expressive, that I offer no apology for here inserting his words rather than mine, confining myself to the most important variations and novelties introduced at Shrewsbury:—

There are two principal divisions of the dairy, in one of which horse-power is necessary, and in the other all the processes are done by hand-power.

The former division may be conveniently referred to as the "SEPARATOR-DAIRY," because it is equipped with both a Danish and a Laval cream-separator.

It has been necessary to make a selection of implements, and to group them conveniently for their use, as follows:—

The *Danish Separator* has been associated with the Holstein churn and other appliances for making *keeping butter* from *ripe cream*; but the same kind of butter might be made equally well with *ripe cream* from the *Laval Separator* worked in any other kind of churn.

The *Laval Separator* has been associated with a rotary churn and other appliances for making *fresh butter* from *sweet cream*, but the same kind of butter might be made equally well with *sweet cream* from the *Danish Separator* worked in the Holstein or any other kind of churn.

The remaining division of the dairy may also be conveniently referred to as the FARM-DAIRY, because it illustrates the means and appliances which should be found in ordinary farm-dairies on both the systems already mentioned.

The *English system* of setting milk in *shallow pans* is associated with appliances for making butter from *ripe cream*, while the *Swartz system* of setting milk in *deep cans* immersed in iced water is associated with appliances for making butter from *sweet cream*; but *sweet cream* butter can be

made equally well from the cream taken off the milk in the *shallow pans*, and *ripe-cream* butter from the cream taken off the milk set in the *deep cans*.

I hope, therefore, it will be quite clear that the cream, being always *taken off the milk while it is still perfectly sweet*, its future manipulation is a matter entirely at the discretion of the dairy-farmer. It may be regarded as certain that good butter cannot be made from cream which is not skimmed while the milk is sweet. But to make *keeping butter* to perfection, it is necessary to use *ripe cream*, and to adopt the *dry method*; while to make butter for *immediate consumption*, the tastes of different people and different markets may safely be consulted. Butter that may taste well the day after it is made may turn rancid in a week, and therefore cannot be called *keeping butter*; while, on the other hand, *keeping butter* should be as good as any other directly after it is made, and should retain its flavour unimpaired for months.*

Two other matters require notice in this Introduction.

Firstly:—the milk used in the Showyard is necessarily obtained from a distance, and under great disadvantages, owing to the pressure of traffic at Show-time; and therefore it cannot, as a rule, be delivered at the dairy in that perfect condition which is desirable for butter-making.

Secondly:—To make good butter in an open shed where the temperature is not under control, and where dust, flies, and other malign influences cannot be neutralised, is a task the difficulties of which will be appreciated by every practical butter-maker.

I should add that the implements used in the dairy are not specially recommended as the best. They have been selected with a view of illustrating as impartially as possible the various systems in use. If space in the dairy had permitted, it would have been easy to exhibit more appliances, but it would have been difficult to show more at work, as a large supply of milk for a limited period is almost impossible to obtain in good condition, especially at Show-time. Even after the selection which has been made, it will strike many people that the dairy is a complicated piece of mechanism; and my explanation is that it is a representation of four types of butter-dairies as I have already indicated. The appliances are therefore necessarily crowded together in a small space. The chief object in the selection of implements and adjuncts which are not exclusively dairy appliances has been to illustrate how labour may be saved in various directions.

Hot water for the supply of the dairy is obtained by means of a steam-pipe from Barford and Perkins's Water-heaters leading to the tank placed above it, and which are thus described by the manufacturers:—

Article 1.—Pans for Boiling by Steam; manufactured by Barford and Perkins, of Peterborough. Strong double-cased galvanised wrought-iron Pans for boiling water, milk, &c. Prices:—60 gallons, 8*l.* 10*s.*; 40 gallons, 7*l.*

THE SEPARATOR DAIRY.

Although steam is by far the most convenient power in an exhibition of this kind, yet for purposes of demonstration it is sometimes necessary to sacrifice convenience in order to carry conviction to the minds of the most sceptical. Therefore it has been arranged to work the Separators by horse-power, as will be presently explained more in detail.

The milk having been brought in the railway churns upon the platform-waggons by the miniature railway, it is weighed by a machine sunk in the floor of the dairy, which is thus described by the makers:—

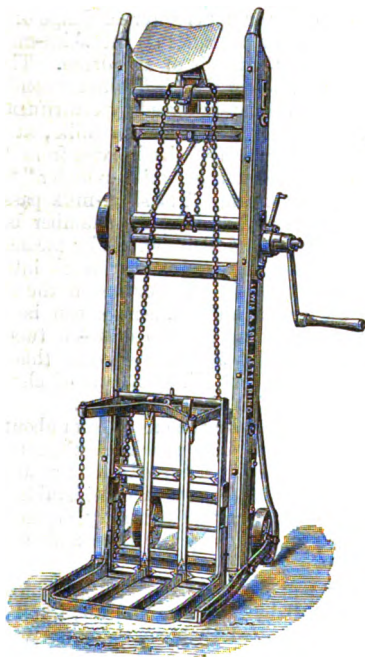
* At York, in 1883, some of the fresh butter was kept as an experiment by different people for periods of four, six, and eight weeks, without perceptible deterioration. This butter contained no salt nor any other so-called "Preservative."

Article 2.—Platform Weighing Machine; manufactured by W. and T. Avery, of Birmingham. Price 7l. 10s. To weigh 5 cwt., also to weigh milk by the gallon up to 40 gallons, also with a tare weight for taring the cans.

The milk in the "churns" is then hoisted by means of a Lewis's Milk-can lifter, which is thus described by the manufacturers :—

Article 3.—Patent Milk-can Lifter; manufactured by G. Lewis and Son, of Albert Works, Kettering, for raising Railway Milk-cans or Churns and delivering their contents into a tank for supplying Separators. This is an entirely New Invention. It is fitted with our Patent Compensating Bar, which ensures a direct and equal lift on each chain under all circumstances; also with a self-acting

Fig. 16.—*Messrs. Lewis and Son's Patent Milk-can Lifter.*



tipping arrangement for emptying the cans when they arrive at the top of the machine. The can is lowered with speed and safety by a Patent Brake. Both Tipping and Return actions are entirely automatic. Height of Delivery, 6 ft. 10 in., price 7l. (These machines are made to deliver at any required height.)

From the receiving tank the milk flows over a heating apparatus, as it is desirable, but not necessary, that before the milk flows into the Danish (Nielsen and Petersen's) Separator, it should have a temperature of about 80° Fahr. The flow is regulated by a special contrivance invented by Professor Fjord, of Copenhagen. The cost of the whole machine, as stated by the Aylesbury Dairy Company, who have lent this small-size horse-power Separator, is as follows :—

44 *Report on Miscellaneous Implements at Shrewsbury, &c.*

		£
Article 4.	{Nielsen and Petersen's Separator, fitted with Professor Fjord's}	45 0
	{Flow-Regulator, complete}	
	{Ahlborn's Heating Apparatus}	5 0
	{Milk-tank capable of holding 14 gallons}	2 0

The following particulars, furnished by the Aylesbury Dairy Company, give a short description of the most important parts of this Separator, and an explanation of its working:—

The drum is a vertical cylinder $15\frac{1}{2}$ inches in diameter, and $10\frac{1}{2}$ inches high, with a cone-shaped bottom, and an annular top, the aperture of which is $9\frac{1}{2}$ inches in diameter. It is enclosed in a cast-iron casing, and rests on a spindle, to which the necessary speed of 2800 revolutions per minute is given by a driving-strap passing over a floor-pinion. A space or chamber is formed for the heavier part of the milk, i.e., the skim-milk, by an annular plate fixed one inch under the cover or upper internal flange of the drum, a narrow slot or groove being left for the entrance of the skim-milk between the circumference of the plate and the inside of the drum. The milk is by means of the two outlet tubes of Professor Fjord's Regulator conducted to the bottom of the drum, and, being immediately forced by centrifugal power to and up its sides, forms what is virtually a cylinder of milk, at the same time the centrifugal force effects a separation of the heavier from the lighter parts of the milk, so that the outer wall of this "milk cylinder" is composed of skim-milk, and the inner surface of cream. The skim-milk passes upwards through the slot or groove above referred to into the chamber between the annular plate and the top of the drum, and is drawn off by means of a tube fastened to the cover of the external casing, and bent to reach into the chamber. A similar tube bent to reach below the plate draws off the cream. The relative proportions between the cream and skim-milk can be altered during the motion of the machine by sliding the two draw-off tubes lengthwise backwards or forwards, and a further advantage which this Separator possesses over others is that, if required, it will, by means of elevating tubes, deliver both products at a height of 8 feet above the drum.

The Separator is designed to take the cream from about 60 gallons of milk per hour, with an expenditure of force much less than that generally known as "a horse-power." The cream is delivered into a cream-can, and the skim-milk is raised by the centrifugal force to a considerable height into a large Lawrence's refrigerator, or, as may be generally deemed convenient, into a new warming and cooling apparatus by the same makers, and thus described by them:—

Article 6.—Improved Patent Apparatus for heating and cooling 150 gallons of Milk per hour; manufactured by Lawrence and Co., Limited, 22, St. Mary Axe, London, E.C. Price 30*l.* 18*s.*, fitted complete.

The skim-milk thus treated is conveyed into ordinary railway milk-churns and is used partly for immediate consumption in the Showyard as a beverage—as is largely the case with the separated milk from English butter-factories.

Each "churn" of milk is conveyed from the truck to the Swedish (Laval) Separator, and is raised to the necessary height by means of a smaller Lewis's Milk-can Lifter (*Article 3*) which has already been described on p. 43. The price of this smaller implement is 6*l.*

The following specification of the Laval Separator and of the working gear has been furnished by the Manufacturer's Agents:—

Article 12.—Cream Separator, De Laval's Patent; manufactured by Mr. Oscar Lamm, of Stockholm, Sweden, and exhibited by Messrs. D. Hald and Co., 24, Great Winchester Street, London, E.C. Price 32*l.* Intermediate gear, 5*l.*

The Separator is worked by a horse-gear for *one-horse*. This horse-gear is specially constructed for two Separators, and its price with the intermediate gear is 12*l.* 10*s.* The Separator will separate cream from about 60 gallons of milk per hour. To facilitate the working, a large cistern is placed on a table behind the Separator, the cistern receives the milk as it arrives in the Dairy, and the milk is then delivered into a small feed-regulator on the top of the Separator.

The feed-regulator consists of a small vessel attached to the Separator, and a float attached to the feed-cock. The quantity of milk admitted to the Separator is increased or decreased by raising or lowering the rod in the conical tube. The float will always keep the milk in the vessel at the same height, and so maintain an equal pressure and regularity of supply at the bowl of the Separator.

Prices (exclusive of cost of packing).

	£	s.	d.
Separator	32	0	0
Intermediate Gear	5	0	0
Horse Gear for one horse, specially arranged for } the Separator	12	10	0
Feed Regulator	1	12	6

The following directions for using this Separator have also been issued by the London agents:—

“The tap which goes with the Separator should be fixed to a milk-can or cistern, placed in such position that the mouth of the tap just passes through the hold in the movable arm.

“Before starting the intermediate gear, the friction pulley should be disconnected by pulling the iron handle, and when all bearings have been well lubricated, the two friction pulleys on the intermediate should be brought very gradually into contact with each other, and allowed to slide for a few minutes against each other, but not faster than that the cylinder and the spindle run at the same speed, otherwise the friction on the wood will burn it out.

“The cylinder should be empty in starting, or if not empty it must be FULL, to prevent shaking.

“The Separator will always shake a little when starting, but brought up to full speed it should run perfectly smooth if well fixed.

“When the Separator has obtained full speed, the milk is admitted through the tap, and the speed should be kept as regular as possible, and the milk should fall exactly in the centre of the feed vessel, at the bottom of the cylinder.

“The temperature of the milk should never be under 60 to 65 degrees, but it may be warmer, or even taken direct from the cow, when the best separation will be obtained. If the milk is too cold, the cream will get too thick to flow out, and in such case some warm milk might be passed through, which will make the thick cream flow more easily.

* * * * *

“Should it be found that the separation of the skimming is incomplete, the reason is this: that the speed is not sufficient, or that the milk is too cold, or that too much is passed into the machine. It may happen that cream more like butter will collect in the cylinder, and this is caused by either irregular feed, and that not sufficient milk is passed into the Separator, or that the small slit in the rim of the cylinder is stopped up with straw, hair, &c., which has not been properly strained from the milk.

“When the machine has to be stopped, the friction pulley on the intermediate should be disconnected, and the machine be allowed to run itself down to standstill without any break being put on.

“After the work has been done, the covers and cylinder should be carefully washed in hot water, and put together ready for work again. During this

cleansing care must be taken that the spindle on the cylinder is not knocked about or bent. If the machine is kept clean, and free from dust, sand, &c., no wear and tear will be observed for some years, and any part can then be renewed at a very trifling cost. If the ends of the spindle and bottom screw should wear down, one of the small iron washers on the screw can be taken off, thereby raising the spindle.

"The machine and utensils used cannot be kept too clean, and cleanliness will secure a much superior cream."

If required to be cooled, the skim-milk, although delivered into a milk-churn on the level of the floor of the dairy, can be automatically lifted and cooled by means of Dr. Bond's "Siphon-tank and Refrigerator," which is thus described by the inventor :

Article 13.—The Siphon Tank is a galvanized iron vessel, holding from 50 gallons upwards; its upper border should not be more than 4 feet 6 inches from the ground, so as to allow of water being easily lifted into it by hand.

The *Refrigerator* is a circular vessel 18 inches in diameter, and from 12 inches in height upwards, which may be placed to stand on the top of any convenient support, according to the height of the churn or other vessel to be filled from it. It consists of three or more lenticular chambers placed on and communicating with one another; with an outlet and inlet, by means of which water can be passed through its interior whilst the milk or other liquid to be cooled flows over the exterior; and with a special internal arrangement by means of which the water is made to circulate through the interior in such a way as to obtain the best possible results from it. The water required for this purpose is conveyed by means of an elastic tube from the Siphon Tank, close to which the *Refrigerator* stands, and a second elastic tube carries it away to the level of the bottom of the tank outside, where it may be allowed to waste or be collected for use again. Where a tank already exists, or where water is laid on by high-pressure supply in pipes, the *Refrigerator* may be used without the tank, being connected directly with the tank or pipes.

It is frequently desirable that skim-milk or separated milk should be kept sweet for a considerable time, and under such circumstances it has been found necessary to warm it immediately after it has been skimmed and separated. For this purpose the newly devised Lawrence's Heater will be used if required. It is thus described by the manufacturers :

Article 14.—An Improved Patent Apparatus for heating milk to or from a Separator, to treat 400 gallons per hour. Manufactured by Lawrence & Co., Limited, 22, St. Mary Axe, London, E.C. Price 11l. complete.

The cream in this section of the Separator-Dairy is churned sweet, but it is entirely a matter of convenience as to arrangement and management whether it is obtained from the Laval or from the Nielsen and Petersen Separator.

The butter having been taken from the churn and carefully pressed with wooden "hands," it is placed in the "hardening box" preparatory to its final working by Bradford's "Springfield" or his "Albany" Butter-worker.

THE FARM DAIRY.

In this dairy the sweet cream is obtained by placing the milk as soon as it arrives in deep cans plunged in a mixture of ice and water. The cream is skimmed every night, and butter is made with it next morning.

Milk is also set in shallow pans and skimmed the next morning, after having stood about 22 hours. It is then kept 24 hours to ripen.

A Lawrence's refrigerator is used for cooling the skim-milk.

On the afternoon of the fourth day of the Show a most unfortunate accident occurred to one of the dairymaids. This circumstance upset the arrangements in the department in which the accident occurred, and some of the operations were not again resumed.

TRIALS OF SHEAF-BINDING MACHINERY.

The fourth competitive trials of Sheaf-binders held under the auspices of the Society were in connection with the Shrewsbury Meeting. At Liverpool, in 1877, the Gold Medal of the Society was offered, the competition for which resulted in three makers entering the field—all of them with American machines, viz. Walter A. Wood, D. M. Osborne and Co., and C. H. McCormick. The Judges decided, after an exhaustive trial, that though great credit was due to the inventors and exhibitors, yet the work done was not sufficiently perfect to warrant them in awarding the Gold Medal of the Society. A silver medal was, however, awarded to Walter A. Wood as a "recognition of progress."

In connection with the Bristol Meeting, held the following year, a trial of binders again took place, when, in addition to the firms previously mentioned, those of J. and F. Howard, the Johnston Harvester Co., Hetherington and Co., and H. J. H. King, then entered the field. During the twelve months' interval between these trials, McCormick had evidently applied his well-known inventive genius to the improvement of his machine, for on this occasion he carried off the Gold Medal, having fulfilled all the specified conditions. Wood's Machine was placed second, with a high commendation.

These trials were not again resumed until the Derby Meeting in 1881, when a Gold Medal was offered "for the best binder, with material other than wire, whether attached to a reaper or separate." The exhibitors, thirteen in number, were allowed to retain their machines up to the date of the commencement of the trials, so as to enable them to adopt any improvements that might, on trial, be proved advantageous. The weather was very unfavourable when the trials took place, which of necessity interfered to some extent with the uniformity so desirable in the condition of the ground and the materials operated upon. The Judges awarded the Gold Medal to the McCormick Harvester Machine Co., and two Silver Medals were given to Messrs. Samuelson and Co. and the Johnston Harvester Co. A full Report of these trials by Mr. John Coleman is given in Part I., vol. xviii. of the 'Journal.'

This Report affords a fitting opportunity for paying a tribute

to the memory of the late Mr. Cyrus Hall McCormick, who died in May last at Philadelphia, U.S., at the ripe age of 75. Mr. McCormick was undoubtedly the great pioneer in the manufacture of reaping-machines. The following extract from an article published at the time of his death gives an interesting account of the rise and progress of the world-famed industry of which he was the founder.

Cyrus Hall McCormick, the inventor of the reaping-machine, was born in Virginia in 1809, of parents both of whom were of Scotch-Irish descent. His father, Robert McCormick, was a farmer, owning several farms, with saw and grist mills, and having shops for blacksmithing, carpentering, machinery, &c., in which the genius of young McCormick early found scope for exercise and experiment.

The facilities for acquiring an education at that early day were much more limited than at present, and the successful men who graduated from the hard school of manual labour into positions of commanding influence owed everything to natural aptitude and an inquiring mind.

In 1831 Mr. McCormick invented the machine which has proved such a blessing to mankind and carried his name throughout all the ends of the earth. The original reaping-machine was crude, heavy, and awkward, but it is the model after which every reaping-machine from that day to this has been fashioned; and no greater honour could be laid at the feet of any inventor than this confession of the world's master-mechanics than that they have not been able to devise any successful plan of harvesting grain by machinery that could dispense with the features in the first McCormick reaper.

For several years Mr. McCormick contented himself with experimenting with his machine, during which time its value was demonstrated by frequent use in the field, and various improvements were made in the details of its construction. The first patent was issued to Mr. McCormick in 1834.

Unlike most inventors, Mr. McCormick had the business tact and shrewdness to profit by his own invention. Since 1849 he has manufactured and sold his own machines, and, in spite of the keenest opposition by rival companies, his business has more than kept pace with the rapid development of the country.

As early as 1816 Robert McCormick, the father of the inventor, devised a reaping-machine with which he experimented in the harvest of that year, but finally abandoned it as impracticable. The fate of the machine invented by Cyrus H. McCormick was different. It was a success from the beginning, though many years elapsed before its introduction into general use. In 1848 but 700 McCormick reapers were made and sold, but the following year the sales amounted to 1500. Since then the annual sales have regularly increased, until last year over 50,000 machines were sold. In the light of these facts how prophetic seems the statement of the Hon. Reverdy Johnson, in an argument before the Commissioner of Patents in 1859, when he said that, from the testimony taken in the case, "the McCormick reaper had already contributed an annual income to the whole country of \$50,000,000 at least, which must increase throughout all time!"

The "original Marsh Harvester" is said to be the foundation upon which all the binders have been built. This machine elevated and delivered the sheaves on to a table ready for binding by hand. When it was discovered how readily this was done, it was seen that an automatic binder was the next

step. Whatever credit may be due to Marsh, the Illinois farmer, for the inception of harvest-binding machinery, it was left to McCormick, who took up the manufacture of the Marsh-harvester, and other makers to complete the work. This has been a work of time and costly experiments. The representative of a firm of competitors at Shrewsbury stated that it had cost no less than 20,000*l.* to bring out their machine in its present form. After a certain degree of excellence was attained by makers in the use of wire as a material for binding, it was urged on all hands that wire was a dangerous and unsuitable material to use for the purpose; it was therefore forthwith discarded. The fresh appliances since brought into requisition have furnished us with that degree of perfection of mechanism which turned work out of hand on Montford Farm in August last, that excited the wonder and admiration of all beholders.

The Judges carefully inspected those machines exhibited that were entered for trial. All that were on exhibition were considered to be qualified to go to the trial-fields; and the competitors were allowed to retain their machines, but were required to give an undertaking to pay 25*l.* in the case of each machine, that it would be produced on the trial-field at the proper time.

Arrangements were made by the Stewards that the trials should begin on Wednesday, August 6th, at Mr. Hawkins's farm, Dinthill, about four miles from Shrewsbury, on the Welshpool Road.

When the Judges arrived on the scene of operations on the morning of the 6th, they found the competing machines parked in a meadow adjoining the trial ground. The weather was all that could be desired. The ground was dry, and in fine condition for carrying the machines. The field to be cut was almost rectangular. It was divided into eighteen plots of three roods each by avenues previously cut with the scythe, and the sheaves had been removed from between each plot.

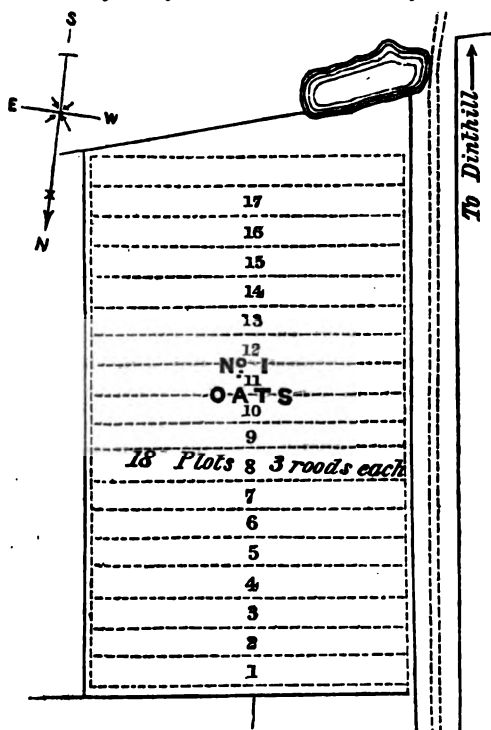
Lots were cast for the plots, with the result as shown in the appended plan (Fig. 17, p. 50).

The field was laid up in 12-yard ridges with shallow furrows: it carried a full standing crop of Webb's Prolific Black Tartarian Oats, which looked like yielding about 7 quarters per acre. There was an entire absence of undergrowth, and all the conditions were favourable for good work. As the machines could not pass each other in the avenues, every alternate plot had to be left. The machines to whose lot fell the plots with the odd numbers were put to work first, two being worked at one time.

Messrs. Hornsby's, No. 4568, entered the field at 9.40, commenced work at 9.55. After working a time round without any

hitch, save three untied sheaves, the gripper was made a little tighter, after which every sheaf was tied, and the whole of the work, sheafing, binding, and delivery, was done in a very satisfactory manner. A sheaf-carrier, to be afterwards described, carried the sheaves round the corners and delivered them at the

Fig. 17.—Plan of Oat-field on Mr. Hawkins's farm at Dinthill.



1 Hornaby, 4568.

2 Kearsley, 383.

3 Woods, 407.

4 Howard, 49.

5 Johnstone Harvester, 189.

6 Samuelson, 286.

7 Kearsley, 381.

8 Hornaby, 4570.

9 Samuelson, 285.

10 McCormick, 216.

11 McCormick, 217.

12 Hornaby, 4569.

13 Howard, 45.

14 McCormick, 215.

15 King and Evans, 228.

16 Howard, 47.

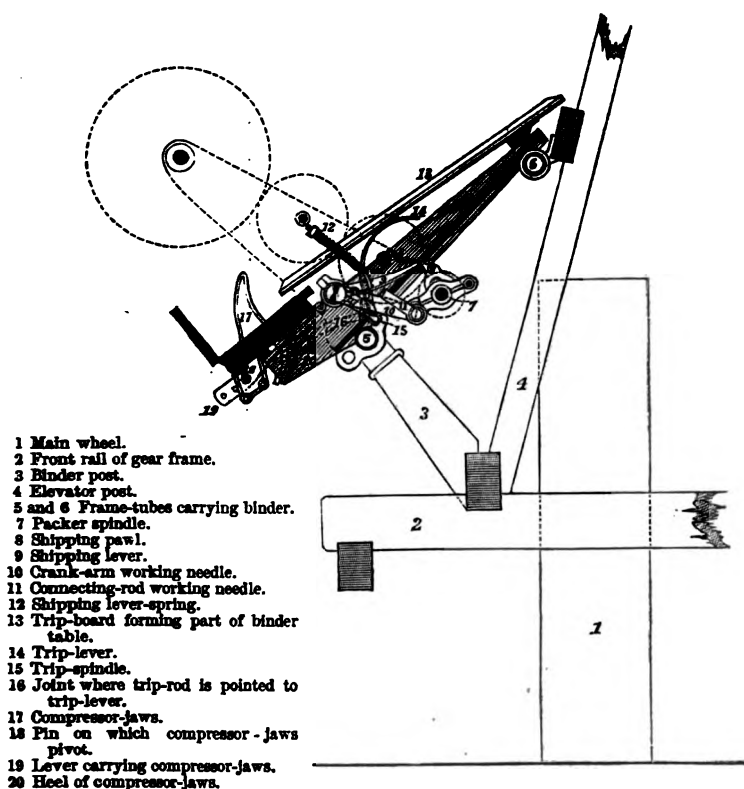
17 Woods, 409.

will of the driver, clear of the horses and machine, for the next round. A strip of about 2 feet wide was left for the finishing cut; this was duly elevated and delivered on to the packers, which kept hold of it until a sheaf of the normal size was collected, when it was then tied and delivered. Time, 34 minutes.

This machine, which obtained the first prize, presents no very marked features that requires description. The construction in every detail is excellent, and there is especially a system of diagonal bracing in the framing of the

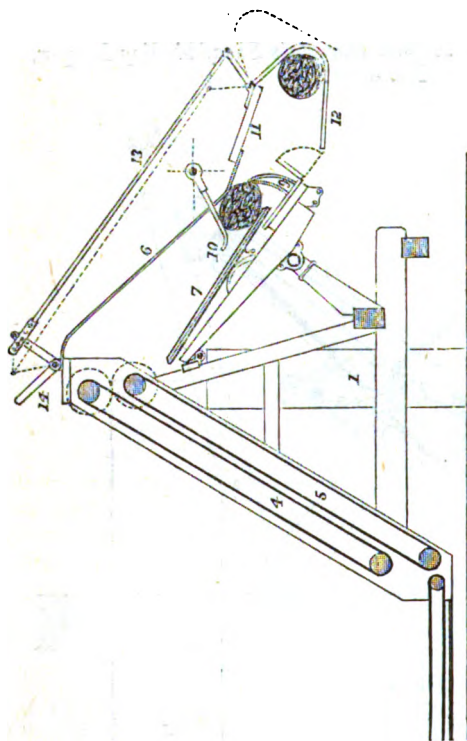
machine which renders it particularly stiff and true. The underside of the platform is made almost flush with the fingers, the woodwork being protected by a slip of sheet-iron close to the fingers (Fig. 20). The main driving-wheel of iron, diagonally ribbed; it runs loose on a spindle, the ends of which are fitted with spur-pinions which gear into the segmental elevating racks. The axle is turned by a chain wound round a small drum, and actuated by a worm winch operated by a handle in the rear of the machine. The range is sufficient

Fig. 18.—Illustration of Messrs. Hornsby's Sheaf-binding Reaper, No. 4568.



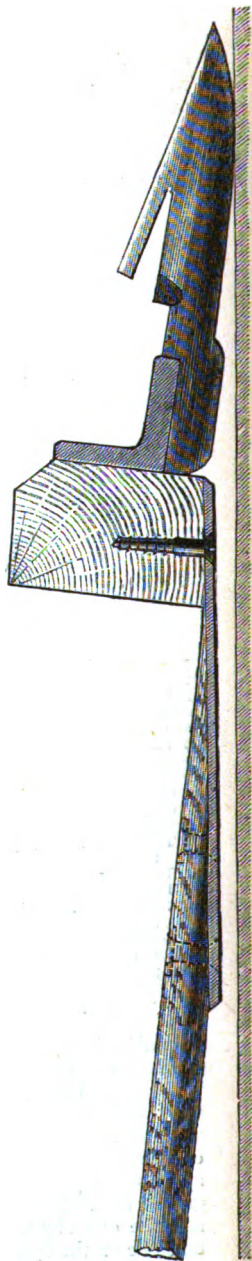
to enable the transport wheels to be adjusted without other packing. The driving-gear is simple, the cross shafts driven from the first motion shaft by two pairs of bevel gear leads forward to drive the knife and binder, and to the rear to drive the apron-elevator and reel. The arrangements for disconnecting the knife are very simple and efficient. The binder is of the Appleby class and has all its motions positive, depending on cam action and not on springs; the plunger-bolt has an adjustment to compensate for the wear of the gripper disc. There are two trips; one operated by a loose section of the deck, and the other by the fork against which the sheaf is packed (Fig. 18). The machine on the dynamometer, in wheat, delivered very regularly, the average

Fig. 19.—*Illustration of the Sheaf-carrier of Messrs. Hornsby's Sheaf-binding Reaper, No. 4568.*



- 1 Main wheel.
- 2 Elevator-apron.
- 3 Ditto ditto.
- 4 Guard over binder platform.
- 5 Trip-boards forming part of binder table.
- 6 Trip-lever.
- 7 Compressor-jaw.
- 8 Elevator.
- 9 Sheaf-delivery board.
- 10 Sheaf cradle.
- 11 Rod working sheaf cradle.
- 12 Lever working sheaf cradle.

Fig. 20.—*Low-cut arrangement for R. Hornsby & Sons' Binder.*



weight of 30 sheaves in two bouts being exactly the same, namely, 15·33 lb., and the extreme variation 14½ lbs. to 18 lbs. The binder apparatus has a traverse of 8 inches for adjusting the position of the string; there is also an adjustable buttor which effects the same object. The reel is very simply arranged. Its carriage has the usual double motion of elevation and projection; it is operated by two handles and actuated by a shaft, the square end of which passes loosely through a square hole in the sprocket driving-wheel at the rear of the machine, while the other runs in a swivelling T-head and carries a small pair of bevel wheels which drive a spur-pinion into which the spur-wheel of the reel-shaft engages. The width of cut is 5 ft. 3 in., and the width of apron 5 ft.

The sheaf-carrier (Fig. 19) is simply a light bent two-prong fork, which can readily be attached to the binder; it is actuated by an ingeniously arranged hand-lever within reach of the driver, and will carry a couple of sheaves round very efficiently. The apron and elevator-canvases are only adjustable by means of the straps and buckles. The lower roller of the outer elevator works in the ends of levers pivoted to the framing at their upper ends, and free to move to a limited degree. By this arrangement the space between the two boards varies according to the requirements of the crop. The rollers have iron gudgeons working in brass bushes securely let into the wooden frames. The platform-apron speed is 5 while that of the elevator is 8. In every detail this machine shows the greatest care and excellence of workmanship.

Plot 3. Mr. Wood's Machine, No. 407, started at the same time, and continued to work without any stoppage until the last round but one, when the fingers picked up a piece of glass and pulled up the machine. The grain was levelled on the web for a start; when this was made, the chain gearing refused to do its work; to clear the elevator caused a stop of 7 minutes, but the work was completed at the end of 40 minutes. The cut was not quite even, the finger-plates caught the furrows occasionally, and the straw was a little crossed in the sheaf, but the work was good on the whole. This machine had no butt web.

This machine is similar to No. 409, described on p. 55. The main driving-wheel is of wood of the "bellows construction," like that used by McCormick, No. 215. The felloes or rim are of wood, shod in the usual way, the spokes form flat cones with their apices turned outwards. One set of spokes is attached to the cast-iron nave, while the others are secured in a "hub," which is capable of sliding along over the nave. The two sets of spokes are drawn together by means of bolts, and so tightened up at pleasure. It is claimed that the thick wooden rims lift less dirt than iron ones. The reel-mechanism is somewhat different from that of No. 409; and the binder, though exactly the same in its main features, yet has a slight addition in the tension arrangement in the shape of a pivoted lever, through the free end of which the string passes, and is kept from forming into a loose loop when soft twine is used.

This machine was run on the dynamometer, in which the sheaves were not very regular; the average of 15 sheaves in 4 runs was 14·87 lb., 14·13 lb., 13·43 lb., 12·6 lb.; the smallest sheaf weighing 11 lb. and the largest 16 lb.

Plot 5. Johnston Harvester Co., No. 189.—The work done by this machine was disappointing. The size of the sheaves delivered was very irregular; and in the second round three sheaves were not tied. A stop was made to put the string into

position, but it broke several times afterwards, causing many stoppages and about twenty-two untied sheaves. The binding was not good, although the cut was fair. Time to plot, 50 minutes. It is only fair to add that, though the draught was apparently very heavy, the horses were of rather a light build, and not well driven.

Plot 7. Mr. Kearsley's Machine, No. 381, began by cutting too high; the stubble was left from 6 in. to 10 in. high. After going five rounds the cut was lowered, and better work made. The platform elevator and butting webs of this machine travel at a great speed, which gives a good delivery, but increases the wear and tear, and also adds to the draught. The plot was finished in 26 minutes without a stop; only one sheaf was untied and three small sheaves made in the last cut. This machine finished with one round less than any of the other competitors, and in much less time than most of them; but the horses, which were driven rather too fast for holding out, were very hot.

Plot 9. Messrs. Samuelson's Machine, No. 255.—Worked well, making in all only three untied sheaves. The cutting was just a little uneven, caused by the swing of the machine. Time, 34 minutes.

Plot 11. Mr. McCormick, No. 217.—The sheaves made by this machine were a little uneven and rather fan-shaped. The cutting was low, the knife-plate occasionally catching the top of the ridges and causing a stop. The knife-points swung up and down a little. Time, 46 minutes.

Plot 13. Messrs. Howard, No. 45.—This machine and Nos. 47 and 49 were drawn by a pair of Biddenham chestnut mares, said to be crossed from the Suffolk. These mares were both active and powerful, two qualities almost essential to the successful working of horse-power machinery. This machine made a level cut and an even sheaf, and got through its work without a hitch until the finishing cut, which was a breadth of less than 2 feet of standing corn. This, when cut, refused to be carried up by the elevator, and therefore accumulated on the platform until it choked the machine, and had to be cleared out by hand. Except this, there were only three sheaves untied; a sheaf-carrier attached cleared the corners. Time in cutting of plot, 29 minutes 10 seconds.

This machine is similar in outline to the ordinary harvester, with canvas grain-elevators and sheaf table. The binding apparatus being on the Appleby system, with single knotting hook, combined with a strong gripper.

Plot 15. King and Evans, No. 228.—The horses stopped in the second round, out of wind. The sheafing was very irregular; a large sheaf was often followed by a small one, with a shearer's

handful of grain lying below it loose. The horses often stopped, very many sheaves were not tied at all, and a bundle of string was picked up, which had been delivered instead of a sheaf. This machine was worked with shafts for the horses instead of a pole; the draught was evidently great. Time, 42 minutes.

Plot 17. Wood, No. 409.—This plot had rather a steep inclination, but the horses did not appear to be distressed with their work. Several stoppages were caused by the string being pulled out of the gripper. The sheaves were rather big, four were unbound, but the cut was fairly good. Time, 37½ minutes.

The binding mechanism of this machine has not been fully described yet. It is distinguished, in the first place, by being all arranged *above* the deck or platform on which the binding takes place, so that it is very accessible. The packing is done between a packing-finger secured to a narrow ledge, against which the corn drops, and which is held up by a rocking-shaft actuated by a lever connected by a rod to a cam arrangement, which permits the ledge and finger to turn back at the moment that the sheaf is ready for being discharged. The packers, which are above the deck, consist of a pair of revolving discs, each containing in their opposite faces three L-shaped fingers, which shoot out beyond the discs and gather in the corn towards the fixed packer-finger, and are withdrawn from the grain within the circumference of the discs as they revolve on the side facing the delivery edge of the deck. When sufficient grain has been packed, the pressure of the sheaf against a trip lever, the tension of which is adjustable, throws the needle-arm into motion, and at the same time stops the packers, thereby relieving the machine from the work of compressing the sheaf at the time when the binding and discharge are going on. The needle-arm is keyed on to a rocking-shaft under the deck, and is actuated by a crank and pitman. The string is rove through a tension regulator through the hollow needle-arm, and is delivered to the gripper on its upper side. This gripper consists of a horizontal rocking-frame or slide, pivoted at one end and caused to oscillate by a lever and cam, the object being to give slack twine for forming the knot. Sliding longitudinally in this frame is a hooked gripper, which has a longitudinal motion produced by a 4-cam wheel and roller, which makes one-fourth of a revolution for every sheaf that is bound. The cam-roller actuates a spring lever, which has sufficient power to hold the string, and range of elasticity enough to compensate for the irregularity of the string. The twine is carried by the needle-arm under the gripper, which is protruded to receive it, and is held by its hooked end against the frame it slides in, the grip being increased by a projecting rib which engages into a recess in the head of the gripper. The knife for cutting the string is well protected, and is also fitted close to the gripper.

The knoter itself has a hollow spindle, the outer one worked by a cam lever and roller actuating a bevel segment, which engages into a bevel pinion on the outer spindle of the knoter. At the bottom of this spindle is a horizontal spiral hook composed of two parts, the upper one formed with a sudden rise on its upper part tailing off to nothing, and with a barbed projection at the extreme tip of its lower part; the other part of the spiral hook fits close under the upper portion, but is capable of sliding round a short way relatively to the same. It is connected to the central spindle, round the upper part of which is wound a spiral spring strong enough to keep the lower portion of the hook firmly against the barb of the upper one; when, however, the outer hollow spindle revolves, a projection on the inner spindle catches against the fixed body of the apparatus and causes the lower portion of the hook to lag

behind the upper, and so open a gap between the barb and the end of the lower spiral. Just above the hook, and in the line of the strings, is a small fixed shelf, on which the strings rest in the first instance. The string from the gripper being over the hook, the sheaf is formed against it; the needle-arm brings the string round the sheaf over the hook, and in revolving partly round forms a loop, which in the return revolution of the hook is pushed off by a small inclined edge fastened over the hook in such a manner, that in the forward turn it slips over the string by the inclined surface, but in the backward turn catches the loop by its vertical surface and pushes it off the hook, which it could do completely were it not that the strings are caught between the lower barb and the under spiral, and so drawn through the loop and tightly secured. In the meantime the needle-arm has carried the string under the gripper again, and there it is held while the connection with the knot on the hook is cut. The ejection of the sheaf jerks the knot out of the grasp of the hook, and so completes the operation.

The delivery apparatus consists of two single prongs, jointed at their upper ends to a horizontal rocking-frame and actuated at their middles by cranks, the shaft of which carries also the cams which work the gripper and the knotter. The prongs strike into the sheaf at right angles and then push it off the deck, the ledge and packing-finger opening back at the same time.

This machine has no butting-web; but the binder gear has an unusually large lateral range, $14\frac{1}{2}$, so that even very short corn can be bound when desired. The main driving-wheel has a shallow central rib round its middle and alternate cross-ribs of the same section. It is of cast iron, and is mounted on a pair of rocking arms, which can be raised or lowered by means of a screw terminating in a convenient handle in the rear of the machine. The gearing is well arranged and protected; the reel is worked in a very ingenious manner, the two motions being given by the usual jointed frame, but controlled by one handle. A screen is fitted, hanging vertically over the apron and about two-thirds of the way back from the fingers; this is for the purpose of preventing the corn being thrown too far back, and is said to be useful in some kinds of crops. A hoop-iron band is laid across the apron at a variable distance from the knife, according to the length of the grain, and is intended to retard the top of the corn, which tends always to traverse in advance of the butt, and it seems to answer the purpose very well. The sheaf cradle is simply and efficiently arranged, and is operated by the foot of the driver.

Work was afterwards proceeded with on the even-numbered Plots.

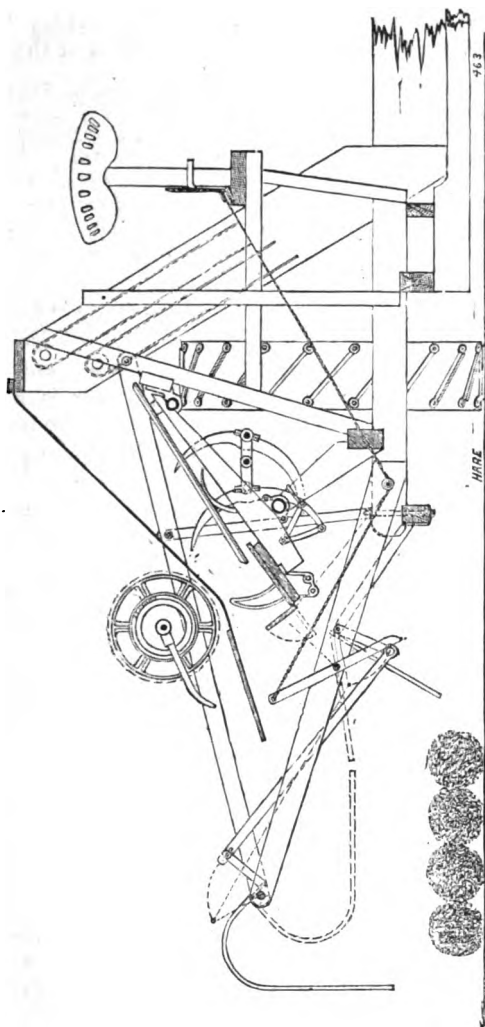
Plot 4. Messrs. Howard, No. 49.—In the third round a nut came off the bolt which retains the platform in its place. This took rather more than 13 minutes to replace, after which the machine went well. Cutting and sheafing were good and regular, until the last cut, which caused the same difficulty as arose with No. 45, already described (p. 54). Time, 48 minutes, including stoppage for accident.

This machine was, in arrangement and design of knotter, the same as No. 45, with the exception that the height and width of it had been considerably lessened, with the view of reducing the weight and cost as much as possible.

Plot 8. Messrs. Hornsby, No. 4570.—This machine has two webs on the platform; the web nearest the cutting-bar is about

12 inches wide, and travels much quicker than the web at the rear, which is divided from the other by a wooden lath. The object is to accelerate the delivery of the butt-end of the cut

Fig. 21.—Longitudinal Section of Messrs. Hornsby and Son's Sheaf-binder, No. 4570.



grain to the elevator; but in actual practice there did not appear to be much advantage in this arrangement, and it obviously added to the number of bearings, which, without it, are sufficiently numerous.

The work done was very good. The cuts were low and even; every sheaf was tied, and the plot was cut in 30 minutes, without any person ever being in attendance but the driver.

A sheaf-carrier was attached and worked, which delivered the sheaves in straight rows ready for storing, the distance between the rows was made at the discretion of the driver.

This machine entirely differs in its binding mechanism from Nos. 4568 and 4569, the knotter having a rotary action instead of a reciprocating motion, as in the case of the Appleby knotter. This arrangement simplifies the parts, and renders the swinging bracket for feeding up the string unnecessary. The raising and reel attachments are similar to No. 4568. On this machine (Fig. 21) a large sheaf cradle was fixed, capable of carrying up to 5 sheaves, and depositing them in wind-rows at the will of the driver. The mechanism of this is shown in the woodcut given on p. 57; and in the trials it was found to work very efficiently.

Plot 6. Messrs. Samuelson, No. 256.—This "Low Delivery" machine differs entirely in principle from all its competitors. The cutter-bar is on the right of the horses, and the sheaves are delivered on to their track. The driver is seated on the outside, on the left of the machine, the furthest point from the line of the uncut grain, and therefore the worst possible place for a driver to be placed. The stubble was left rather high, but the sheaves were good, only a little fault occasionally in the separation. The sheaf was often dragged until another was nearly ready to be delivered, which made a ragged side to these sheaves, but there were none left untied. The horses were very hot, so we concluded that the draught was heavy. Time occupied, 38 minutes.

The cumbersome form of sheaf-binding harvesters has undoubtedly militated against their popularity with the English farmers, and Messrs. Samuelson & Co., fully alive to this objection to the employment of binders, have devoted their energies to the perfection of a machine which would modify the objections to the use of what is known as the "overhead" binder. In the present machine the elevating aprons are entirely dispensed with, the grain is taken direct from the platform to the knotter, and the sheaves are discharged close to the ground. This arrangement shortens the "travel" of the cut corn, and there is no rubbing out of the grain between canvases. The formation of the sheaf and the binding are directly in view of the driver; and in fact from the time the crop is cut until the sheaf is delivered he does not lose sight of the grain, and the exceeding accessibility of the various working parts, none of which are hid from view or covered up, will at once strike the attention of the visitor. The packing and tying apparatus is suspended upon rollers, and by means of a lever the whole apparatus is moved backwards and forwards, from which the ease and rapidity for altering the position of the band round the sheaf will be understood; the advantage of this instantaneous "shifting" of the binding apparatus will be apparent in irregular or uneven crops. The gathering reel in this machine is ingeniously designed, and enables the driver, by simply turning the handle, to raise or lower, or throw it forward or back, as the necessities of the crop may require. One of the serious objections to the overhead binder is the inequality

of the balance of the machine when cutting on a hillside, for this purpose the old form of binder is quite unsuitable. In Samuelson's new machine this is sought to be obviated, all the weight is between the large road-wheel and the wheel at the far end of the finger-beam; in fact, this principle is neither more nor less than the same as that adopted in the ordinary self-delivery reaper, but with the exception that the wheels are placed farther apart to allow for the space necessary for the delivery of the sheaf, and the apparatus for binding it. The crop as it is cut falls upon an endless moving apron, which conveys it under the bottom edge of another apron placed vertically and at right angles. It is then gently moved forward by the conveyers to the packers, which take the grain, and after sufficient has been gathered to form a sheaf, the tying apparatus comes automatically into operation and ties the sheaf, which then slides on to the ground by the inside of the travelling wheel, the fall being one of a few inches only.

Plot 10. Mr. McCormick, No. 216.—This machine has a 6-feet cut, and retains the wooden connecting rod worked from behind and attached to a lever in the centre of the back of the platform, and this lever drives the knives.

The cut was level, but the divider on the off-side shoe which separates the cut from the standing corn did its work indifferently. An attendant had frequently to relieve this article of a handful of loose grain, which it persistently collected. Only two sheaves were untied, but the attendant had three sheaves to drag off. Time, 28 minutes.

Plot 12. Messrs. Hornsby, No. 4569.—A large tree was standing in the centre of this plot, around which animals had evidently been accustomed to congregate when the field was in pasture, as the crop was there green and tangled, and part of it much laid. A stop in the work was caused by two large stones. I find in my notes: "Cut beautiful, delivery good, binding capital." There were no untied sheaves; but in the laid portion, sheaves were three times delivered in pairs, owing to this tangle.

This machine differs but little from No. 4568; the driving-wheel is smaller, and the whole weight of the machine is considerably less; the delivery of the sheaf is also lower. The arrangement for raising and lowering the machine consists of a worm and wheel instead of an endless chain.

Plot 14. Mr. McCormick, No. 215.—The cut was very low at the start, but a halt was made and the cut raised. This machine delivered a nice sheaf, well bound, and not one was left untied. The sheaf-carrier was not a success; it was cumbersome and rather spasmodic in action. Time occupied, 34 minutes.

This machine has been much improved and simplified since the Derby Show in 1881. In the binding mechanism several of the motions which then depended on the action of springs are now made positive cam-actions. This is the case with the plunger-bolt, which has also been fitted with a screw adjustment to regulate the position of the string-holder

and the tucker which holds the string up to the hook. The machine has three trip motions. One, actuated by the driver, which enables a sheaf to be dropped anywhere, and obviates the necessity of a sheaf-carrier; one which comes into operation when the sheaf is too tightly packed, by the pressure acting on a narrow movable section of the table; and, lastly, the ordinary automatic trip. The trip-hook is made adjustable, so that six different sizes of sheaves can be made, and there is an arrangement by which it is held rigidly through the intervention of a stop on the boss of the needle arm, which is released at the moment of tripping. The effect of this is said to be that the sheaves are very regular; and certainly on the dynamometer trials the average weight of 15 sheaves in each of four runs was 17·53 lb., 17·8 lb., 17·5 lb., and 17·3 lb.; the extreme difference in weight between the sheaves was 4 lb. The tension arrangement is improved, and allows loops and knots to pass freely, and the binder can now be traversed by the driver so as to bind the sheaf where required. The lower roller of the outer elevator sheet works on two free arms, which are capable of limited rocking action, so that the apron opens to allow of thick masses of corn, thus avoiding undue strain; and the horizontal apron has an arrangement by which the outer roller can be moved out by a simple combination of winch and rack, this allows the tightness of the web to be altered without touching the straps. The reel is also much improved; it has a vertical and longitudinal motion, which can be governed by the driver, the whole very ingeniously and simply arranged. The throwing-out gear of the main clutch is also very much improved, and the general arrangement of the driving gear has been simplified.

Many interesting points of detail in the construction of the wood and iron main driving and grain wheels; in the arrangement of the fingers, platform, and driving-lever of the knives; in the adjustment of height in the main driving and grain wheels, and in the general construction of the machine, deserve favourable comment.

Plot 16. Messrs. Howard, No. 47.—With the exception of losing one of the fans of the reel in the first round, this machine had no history on this plot. Cutting, binding, and delivery were all alike very good. Time occupied, 29 minutes.

The special feature of this machine, which obtained the Society's Second Prize of 50*l.*, is the rotary knotter, which here takes the place of the Appleby knotter, for which the exhibitors claim a more certain action and a reduction and simplification of the working parts, which are now reduced to only six moving pieces, illustrated in detail in (Figs. 22-26, pp. 61 and 62).

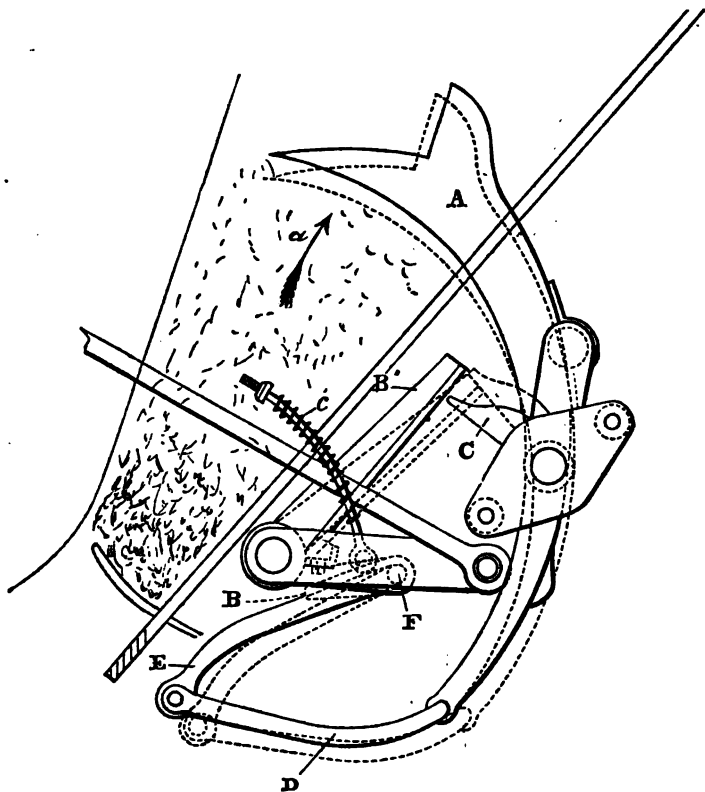
The manner in which the binding mechanism is put in motion varies from other machines. The motion is transmitted to the binding mechanism by a shaft passing from side to side of the machine under the binding table, driven from the first motion chain at one end and having a clutch pinion for driving the binding mechanism at the other, the packers being worked by intermediate cranks. The packer is in direct connection with the starting lever, so that whenever the pressure "behind" the sheaf exceeds the pressure of the retaining spring on the clutch lever, the mechanism is started. By this arrangement the binding mechanism cannot be started by the drag of an out-going sheaf. The binding arm or needle is grooved along its back, which protects the string from entanglement in the crop. The butting board is adjustable, being kept square with the sheaf, whatever position the buttor canvas may be in.

The bearings for the elevator canvas are fitted with springs, so as to keep the canvas taut under all circumstances of weather. The machine is fitted

with a forked sheaf carrier, which conveniently carries two sheaves round any corner and drops them clear of horses or machine on the following journey.

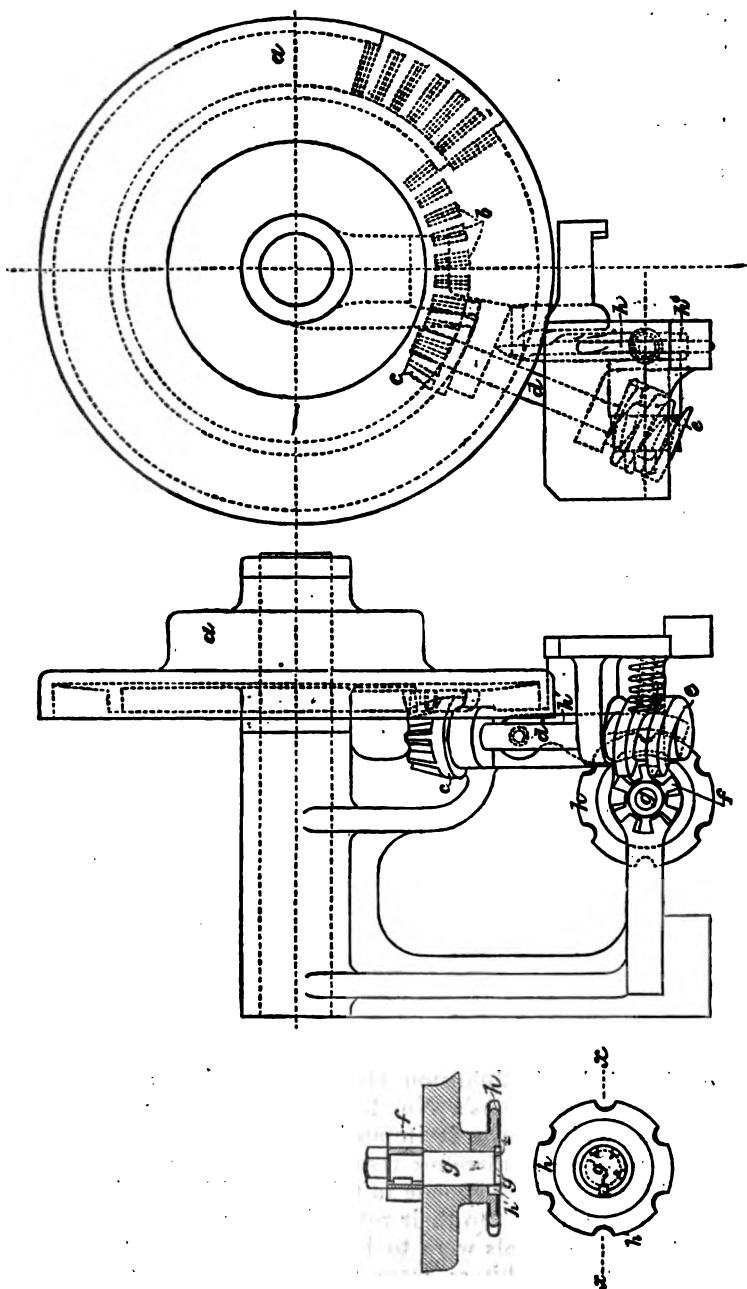
The competing machines having now each had an opportunity of exhibiting their powers to the Stewards, Judges, and the public generally, a council of the Stewards and Judges was held, when it was unanimously agreed that the work performed

Fig. 22.—*Messrs. Howard's Sheaf-binder.*



on Plot 5 by the Johnston Harvester No. 189, and on Plot 15 by King and Evans's No. 228, placed these machines in a position which made it impossible for them to appear in the prize list; it was therefore resolved that no further trial of these machines should be made in this competition, notice of which resolution was sent to their respective exhibitors.

The further trials were to be held on Mr. Minton's farm at Montford. Exhibitors were therefore directed to have their

Figs. 23-26.—*Messrs. Howard's Sheaf-binders.*

machines parked in a clover field situated in the centre of the trial fields, and to be ready for work when called upon on the following day.

Trial of Independent Sheaf-Binders.—The Stewards determined to take the trials of “Independent Sheaf-Binders” as the first order on the morning of the 7th. A field of oats containing three acres had been secured on land near Preston, Montford, in the occupation of Mr. G. B. Lloyd. The crop, which was not heavy, had been cut in three sections by a self-delivery reaper, and the sheaves delivered in fair form. Only two machines were forthcoming.

These were exhibited by The Notts Fork and Implement Co., Ranskill, Bawtry, Nottinghamshire, Article No. 195; and by Messrs. Kingsford, Fairless and Co., of Acre Road, Kingston-on-Thames, Surrey, Article No. 198.

The former machine commenced to work where the reaping-machine had finished, the horse travelling by the butt-end of the sheaf, and the machine lifting the sheaf on the left side. At the end of the first time along, which was down hill, a loose sheaf was thrown off, and a little piece laid end on stopped the machinery, which took some time before operations could be resumed. On the return journey, which was up-hill, quite half the sheaves were untied, and every time the tripper was brought into action the side-draught was so great, that the shaft was brought bang against the side of the horse, and diverted the poor animal from the straight course he was hopelessly endeavouring to pursue. In the second round, eight sheaves were missed, and horse and machine travelled over the preceding row of sheaves that had been delivered loose. In the middle of the third round the string came out of the gripper, and ceased to attempt to tie. Those sheaves which had a piece of string round them presented a great variety of shapes, but were all alike in being badly tied.

The exhibitor was asked at this stage of the proceedings if he was satisfied with his trial, and he answered “quite.” It need not be added that the Judges required no further trial.

Messrs. Kingsford, Fairless, and Co.’s machine had shafts wide enough to hold the biggest Shire mare in the most interesting condition. The weedy pony which had to do duty for a horse was in keeping with the want of fitness which pervaded this machine. When a start was made, the first seven sheaves were taken up and laid down loose; a few sheaves had a piece of string placed round them somewhere—somehow. Not one sheaf was properly tied. When the machine got about half-way down the field a breakage occurred, which stopped further procedure: comment or description is unnecessary. The trial

of "Independent Sheaf-Binders" must be reported upon as a failure on the part of the competitors.

The "Independent Sheaf-Binders" having been so summarily disposed of, a move was made to Montford Farm, which is situated in the valley of the Severn, about seven or eight miles from the Welsh border. Standing upon Montford Bridge upon the Holyhead road, and facing west, you see Ponsert Hills standing out prominently and somewhat lion-like in shape; on the left, and extending towards Wales, are the Stiperstones, upon the summit of which range is an ancient cairn called the Devil's Chair. A range of hills, named the Long Mountains, continue the line of vision into Montgomeryshire, where the view terminates with the three coned pinnacles of the Brudden, Moelygolva, and Middleton, usually called the Breidden Hills. Upon the summit of the Briedden is an obelisk erected to the memory of Admiral Rodney, and known as Rodney's Pillar. This scenery and district grew upon us, as day after day we travelled to and from Shrewsbury, ever discovering some new source of interest.

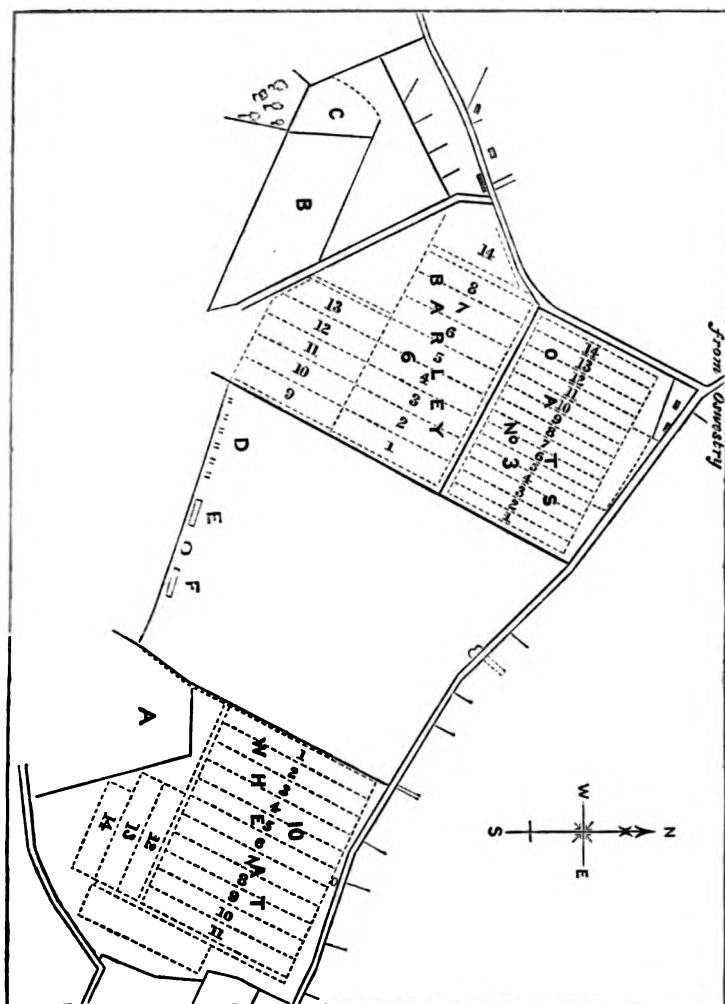
Mr. Minton's Farm of Montford, where the real "tug of war" took place, was awarded third prize in the Arable Farm Competition, and has been well described by Mr. J. Coleman in his admirable Report which appeared in the last number of the 'Journal.' I cannot forbear to add my testimony to the spirit of enterprise and indications of good farming which met us at every turn on this farm. The quiet decision, which only required to know the wishes of the Stewards and Judges to have them immediately carried out, was quite in keeping with what we saw of Montford Farm and its management. The diplomas of the Royal Agricultural College and of the Royal Agricultural Society have both been conferred on Mr. Minton, whose agricultural career does credit to both Institutions.

This neighbourhood may fairly be called the heart of the original breeding district of Shropshire sheep. The flock of Mr. R. Gittens, which flourished on Ensdon House, was celebrated long before anything was heard of the breed except locally. Mr. J. Bowen-Jones's famous flock, now on Ensdon House, is directly descended from that of Mr. Gittens. Mr. Minton's rams carried off first honours at Derby and Reading, and have let at extraordinary prices.

This district is also identified with the breed of Hereford cattle, the Montford and Ensdon House herd being well known in Hereford circles.

The appended plan of Montford Farm will show the position of the trial-fields and also the relative positions of the

Fig. 27.—Plan of Trial-fields on Monford Farm.



OATS, No. 3.

- 1
- 2 Woods, 409.
- 3 Samuelson, 256.
- 4 McCormick, 217.
- 5 " 216.
- 6 Samuelson, 255.
- 7 Hornsby, 4570.
- 8 " 4563.
- 9 Howard, 49.
- 10 Kearsley, 381.
- 11 Hornsby, 4563.
- 12 Howard, 45.
- 13 " 47.
- 14 Woods, 407.

— McCormick, 215.

BARLEY, No. 6.

- 1 Howard, 49.
- 2 Hornsby, 4563.
- 3 Howard, 45.
- 4 McCormick, 216.
- 5 Howard, 47.
- 6 Samuelson, 255.
- 7 McCormick, 217.
- 8 Hornsby, 4569.
- 9 Kearsley, 381.
- 10 Hornsby, 457.
- 11 Woods, 407.
- 12 Samuelson, —.
- 13 Wood, 409.
- 14 McCormick, 215.

WHEAT, No. 10.

- 1 Wood, 409.
- 2 Samuelson, 255.
- 3 Hornsby, 4563.
- 4 Kearsley, 381.
- 5 McCormick, 219.
- 6 " 216.
- 7 Howard, 45.
- 8 Hornsby, 4570.
- 9 " 4569.
- 10 Wood, 407.
- 11 McCormick, 215.
- 12 Howard, 47.
- 13 " 49.
- 14 Samuelson, 256.

A. Wheat Dynamometer Tests.

B. Consecutive runs with 8 selected machines

C. Final runs between Hornsby and Howard.

D. Machines parked.

E. Stewards' tent.

F. Luncheon tents.

plots allotted to the competing machines. The trials were resumed on field No. 3, oats after lea. The crop was over-ripe, the heads of the grain were broken down and much tangled, and occasional patches were laid. The cut was in a line with the ploughing, and the open furrows were in some places rather deep and wide. There was an entire absence of grass or weeds in the stubble. From the foregoing description of the crop, it will be inferred that the work done in this field was of a much more trying character than that done at Dinthill. Though the plots were somewhat uneven in character, owing to some having large patches of laid corn in them, yet the tangled and broken straw was much the same all over. Taking the nature of the crop into account, the whole of the competing machines turned their work out of hand in a highly creditable manner. Those machines which worked in the plots up to and including No. 8, were considered to have escaped laid patches. They were therefore sent consecutively round No. 1 Plot, which was not allotted to any machine on account of the crop it carried being so much laid. These machines respectively came well out of the ordeal. The cutting was good, but, as was to be expected, in the laid portions the sheafing and binding were not all that could be desired. There was also, with most of the machines, a tendency to drag the sheaves and to deliver them in pairs, the tangled straw being difficult to separate. So good was the work done in this field generally, that the Judges determined not to make—or at least not to publish—invidious comparisons until further trials.

WHEAT TRIALS.

On the morning of the 8th of August, operations were resumed in field No. 10, which carried a nice level crop of red wheat, standing about 4 feet to 4 feet 6 inches high, grown after two years lea, which had been mown once in each year and afterwards ploughed into breaks of 24 yards for the reception of this crop. The direction of the cut was again in line with the furrows, except in Plots 12, 13, and 14, which were cut across the furrows, and then the field carried a crop of very ripe white wheat. Security of binding and uniformity in the size of the sheaf were obviously important elements in the competition. The following notes and the table on p. 68, as to the comparative results of the work done in the wheat trials, will be found interesting:—

Following the trials which had been made in oats, two-acre plots of wheat were set out for all the fourteen machines left in competition; the plot for each machine was decided, as usual, by drawing lots, though, with the exception of one hollow, there was little or nothing to choose between the various plots.

The crop was generally upstanding and very uniform, the difference in weight of the crop per acre being due to the fact that in some instances there was more grass in the butts of the sheaves than in others.

With the exception of Samuelson's Low-Delivery Machine, all the others got through their allotted work. The failure of this machine was very unfortunate, as there were special features about it which would have given an additional interest to further trials, and it was with much reluctance that the Judges had to abandon it. The time occupied in cutting each plot was noted, but as it was clearly understood that excellence of work done in cutting and binding would count for more than horse-racing, the observations taken were merely used as a check in case of stoppages. Each machine started with a given quantity of string weighed out to it, and what was left over at the end of the trial was credited against what had been served out. The weight of string varied very much, the variation being due not so much to any increase in the length of string used as to the strength, or weight of a given length, of string. The hemp string used was generally heavier and stronger than the Manilla; such, however, should not be interpreted as proving any decided advantage of hemp over Manilla, as the latter, used in Wood's Machine, No. 407, gave a mean breaking strength of band of 137 lbs., which is an ample strength for all purposes. The mean girth was taken by cutting the strings off of some 20 or 30 sheaves and measuring the string.

The weight of crop per acre was arrived at in a similar manner, by weighing some 30 or 40 sheaves, and multiplying their mean weight by the number of sheaves per acre.

The testing of the breaking strain of the bands at once showed the great improvement which has taken place in the knotting apparatus since the former trials, as it was found that out of about 300 bands tested hardly any slipped at the knot.

Table III. (page 68) gives the results of the various observations taken of the materials used and the work done by each machine.

Scarcely a breath of air moved the standing corn while the wheat was being cut, and the thermometer stood about 90°. These conditions were highly favourable to the machines, but rather trying to those whose duty it was to keep watch and ward over every machine while it was engaged in doing its allotted task.

On page 69 is a condensed summary of notes taken while the machines were at work on the two-acre plots of wheat. It is obvious that the reporting Judge could not be an eye-witness of all the work done by each machine; but it is due to the Stewards to say that not a sheaf was put off any one of them

TABLE III.—TRIAL OF SELF-BINDERS IN TWO ACRE PLOTS OF WHEAT.

	409.	255.	4569.	381.	217.	216.	45.	4570.	4569.	407.	215.	47.	49.
Kind of string	Wood.	Samuelson.	Hornaby.	Kearley.	McCormick.	McCormick.	Howard.	Hornaby.	Hornaby.	Wood.	McCormick.	Howard.	Howard.
	{ Manila. Hemp. }	Manilla.	Hemp.	Hemp.	Manilla.	Manilla.	Hemp.	Hemp.	Hemp.	Manilla.	Manilla.	Hemp.	Hemp.
Weight of string per acre	lbs. ozs. 2 10½	lbs. ozs. 3 24	lbs. ozs. 2 14½	lbs. ozs. 3 4½	lbs. ozs. 2 3	lbs. ozs. 2 13½	lbs. ozs. 3 24	lbs. ozs. 2 14½	lbs. ozs. 3 1½	lbs. lbs. 2 14½	lbs. ozs. 2 0½	lbs. ozs. 2 8	lbs. ozs. 2 16½
Total number sheaves cut	960	1343	1695	1288	1037	1331	1280	1010	1275	1060	980	1210	1139
Mean girth of sheaf ..	inches. 31.7	inches. 30.6	inches. 30.4	inches. 29.7	inches. 29.8	inches. 27.89	inches. 29	inches. 31.9	inches. ..	inches. 31½	inches. 29.79	inches. ..	inches. 29.77
Mean weight of sheaf ..	lbs. 19	lbs. 13.9	lbs. 18.6	lbs. 15.13	lbs. 17.7	lbs. 13.8	lbs. 14.2	lbs. 18.1	lbs. 16.25	lbs. 15.9	lbs. 19.3	lbs. 14.4	lbs. 16.16
Range of weight of sheaf	lbs. lbs. 13 to 21½	lbs. lbs. 10 to 16	lbs. lbs. 15 to 23	lbs. lbs. 12 to 19½	lbs. lbs. 4 to 19	lbs. lbs. 8 to 17	lbs. lbs. 10 to 18	lbs. lbs. 15 to 23	lbs. lbs. 14 to 20	lbs. lbs. 10 to 1½	lbs. lbs. 18 to 21	lbs. lbs. 11 to 18	lbs. lbs. 13 to 18
Breaking strain of band	lbs. 103	lbs. 136	lbs. 163	lbs. 134	lbs. 88	lbs. 109.6	lbs. 165.1	lbs. 145.3	lbs. 147	lbs. 137.4	lbs. 66.2	lbs. 149.6	lbs. 120.4
Range of breaking strain	lbs. lbs. 60 to 140	lbs. lbs. 113 to 196	lbs. lbs. 130 to 176	lbs. lbs. 112 to 184	lbs. lbs. 56 to 112	lbs. lbs. 84 to 140	lbs. lbs. 84 to 160	lbs. lbs. 140 to 168	lbs. lbs. 112 to 195	lbs. lbs. 112 to 169	lbs. lbs. 20 to 100	lbs. lbs. 130 to 180	lbs. lbs. 97 to 168
Weight of crop per acre	lbs. 9120	lbs. 9333	lbs. 9387	lbs. 9243	lbs. 9177	lbs. 9188	lbs. 9088	lbs. 9140	lbs. 10,358	lbs. 8347	lbs. 9457	lbs. 8717	lbs. 9203

in this field but what came under the careful supervision of at least one of their number.

Plot 1. Wood, No. 409.—Low cut: finger-plate scratching ground. Second round, string broke. Sheaves too big, string broke again in the fourth round. Changed the string, adjusted packer and made smaller sheaves. The sheaves were fan-shaped and delivered with the knot up, the kicker not turning the sheaf over. This machine had frequent stoppages; the string evidently did not run well; time occupied in adjustments, 8 minutes 15 seconds. There were also a great number of loose sheaves and some small ones. Time, 1 hour 34½ minutes.

Plot 3. Hornsby, No. 4568.—The binding and delivery of this machine were throughout good; the cut over a laid portion was only indifferent, little more than the heads being taken off, and on this piece pairs were given off; eight sheaves in all were untied. Four stops, occupying 5 minutes, 8 couplets, 1 triplet, 6 pieces of loose. Time, 1 hour 28 minutes.

Plot 5. McCormick, No. 217.—A stop of 50 seconds was caused in the first round by the chains of the horses being too long. This machine oscillated, which caused the cut to appear somewhat uneven; 7 stoppages occurred, taking in all 2 minutes 50 seconds; 7 loose sheaves, and several twin deliveries. Time, 1 hour 48½ minutes. It may be only fair to state that the horses travelled very slowly.

Plot 7. Howard, No. 45.—This machine made an even cut and took up laid pieces well, with a regular delivery and an even-sized sheaf. The separator on the off-shoe did not do its work well—many heads were drawn out, which in the next round were cut off and left on the ground; two stops occurred, each 1½ minutes, one for a stone in the fingers and another for a choke on the platform. 14 unbound sheaves; 26 slightly coupled, 4 loose bits not in band. Time, 1 hour 21½ minutes.

Plot 9. Hornsby, No. 4569.—This machine cut over the laid straw, but made good sheafing and binding where the lie of the crop was to the machine. The delivery where the lie was from the machine was not so good, the sheaves coming off in couplets and triplets, with loose straw between; work not so good as No. 4568.

Plot 11. McCormick, No. 215.—The platform apron of this machine can be tightened or slackened by a ratchet placed at the off-corner of the platform, which is a convenient arrangement. A stop took place during the first time down in a piece of laid corn; previous to the stoppage a deal of loose unbound corn had been delivered, and the cut was only moderate; when the grain was swayed away from the machine the work was not good, though where the corn stood up well, neat work was executed.

Plot 13. Howard, No. 49.—This plot was on the south side of the field and the cut lay across the ridges: saving the furrows, it was quite level, the crop very even and presenting no difficulties. The work done throughout was good; there were no stoppages, and no twins, but there were 10 unbound sheaves. Time, 1 hour 26 minutes.

Plot 14. Samuelson, No. 256.—"Low delivery." This machine worked in the adjoining plot to No. 49, just described, and was placed in precisely similar circumstances. Considerable interest was exhibited in the working of this machine, which was so unlike in appearance and character to the whole of its rivals. It was therefore a matter of universal regret, when an unfortunate breakage in the seventh round suspended operations. In crossing a furrow the packer cam broke, and the frame was also sprung to some extent. The fractured part was repaired and work was resumed next day, but the machine had evidently got a strain, as a very narrow width had to be cut to prevent

shaking the binder, and a number of sheaves were unbound. So far as the trial, before the breakage occurred, permitted us to form an opinion, we considered there was a want of room for clearing the sheaf after it was tied. A large proportion of the sheaves dragged until the next was nearly ready to be delivered. We also thought that there was some waste of corn by shedding, caused by the grain being rubbed between the platform and the elevator. The draught also appeared to be heavy.

Plot 2. Samuelson, No. 255.—This plot had a gravel hole in the centre, with the sides sloped in so that it could be cultivated and cropped. The machine got well over this difficulty, and, on the whole, made beautiful work; but had many casualties during its progress. The string broke several times, and much time was lost in threading the needle. The stoppages occupied 17½ minutes; 19 sheaves untied, and 6 small sheaves or “babies.” Time, 1 hour 55 minutes.

Plot 4. Kearsley, No. 381.—This machine had a good plot and made a good cut, but the elevating and sheafing left something to be desired. Three chokes occurred, when several armfuls had to be taken out each time by hand to clear the elevator. The attendant was generally rendering assistance to the elevator. A large number of “baby” sheaves were also made; this was said to be caused by the nut upon the tension string being too slack on the thread of the bolt. There were 19 unbound sheaves. Time, 1 hour 25 minutes. A pair of sharp-stepping horses appeared to be well pumped out when they had finished their task.

Plot 6. McCormick, No. 216.—This machine has a cut of 6 feet, and generally made full width amongst standing corn, but did not make good work in heavy and laid pieces, as will be seen from the record of twins. A narrow strip was left to finish, in cutting which the platform-web choked, caused by the thin line of grain falling in between the platform-web and the elevator-web, and, following round the former, stuck between it and the base of the platform. There were 4 stoppages, occupying 6 minutes 10 seconds; 120 twins, and 6 sheaves untied. Time, 1 hour 29 minutes.

Plot 8. Hornsby, No. 4570.—The corn-divider on the off shoe did not do its work perfectly, a thin line of uncut straw was left in each track. A stop was caused by the canvases fouling with a small stone at their junction. Two additional stops were caused by the choking of the elevator. The Steward reported 21 twins, 3 sheaves unbound, besides half a sheaf of loose corn.

Plot 10. Wood, No. 407.—On a portion of this plot the grain was shorter in the straw; the sheaves on that part were bound too near the grain end of the sheaf, and approached in appearance to what are known in the North of England as “Gatings.” A stop of 7½ minutes was said to be caused by picking up a stone; 53 twins and 4 triplets were reported; 1 sheaf was unbound. Time, 1 hour 24 minutes.

Plot 12. Howard, No. 47.—Left a good stubble; a stop of 1 minute was required to straighten the inside divider. A second stop of 55 seconds was required to clear a stone out of the finger-plate; and a third stop of 1 minute to alter a spring. Twelve sheaves were untied, but there is no record of twins or babies. Time, 1 hour 23½ minutes.

In drawing conclusions from these records of work, it is only fair to take into account the *possibility* of some of the enumerators having a keener eye for “twins” than others.

While I am endeavouring to describe as clearly as I possibly can the work done by each machine, I am compelled to state that there are surrounding circumstances connected with that

work which are difficult to chronicle. It is obvious that where the pitch of the finger-plate, the elevation and position of the collecting reel, the movable butting board, &c., are all capable of being adjusted by the driver to the ever-varying condition and position of the crop he is handling, and that, be it observed, without stopping the machine, it does not require much demonstration to show that much depends on the man who runs the machine for the kind of work that is turned off. It is not, however, at all times clear or safe to say, when faulty work is done, what share of the fault is due to the machine and what to the driver.

After revising and comparing notes, the Judges agreed to recommend to the Stewards that all the machines which had been engaged in the wheat trials should be sent forward to the barley fields for further trial.

BARLEY TRIALS.

The field No. 6, as shown on the plan of Montford Farm, carried a good crop of barley after lea ; it was short in the straw, some of it was very ripe, but patches were not so ripe, which indicated variations in the soil, caused by the slight elevations over the surface of the field. Though there were some laid patches, some little hills and hollows, yet none of the plots presented any serious difficulties to the competing machines.

The three machines to whose lot it fell to cut Plots 1, 2, and 3 were started in as quick succession as the avenues could be cleared for them, each machine being under the supervision of a Steward while at work.

On Plot 1, Howard's machine, No. 29, when going the twenty-seventh round, broke down. The front end of the footboard broke off where the attachment for adjusting the height of cut by a lever is bolted on. The horses were unyoked. The Judges and Stewards agreed to put the machine out of competition, but, if repaired in time, the machine might finish its plot for report. After a delay of 1 hour 16 minutes, this machine resumed work and cut out the plot.

The appended tabulated statement (Table IV., p. 72) is a condensation of the notes taken in this field of barley.

On the conclusion of the trials in these two-acre plots of barley, it was resolved by the Stewards and Judges to retain eight machines for further trial.

After the necessary balloting for plots was got through, the notice given on page 73 was posted at the Stewards' tent on Monday evening.

TABLE IV.—TRIAL of MACHINES in TWO-ACRE BARLEY PLOTS, Aug. 11, 1884.

Plots.	No of Machine.	Maker.	Time of Running.		No. of Sheaves Missed.	Pairs.	Small.	Stoppages.			Cause of Stoppages and other Remarks.
			h.	m.				h.	m.	s.	
1	49	Howard.	1	36	19	7	..	1	16	0	End of footboard broke.
2	4568	Hornsby.	1	33	10	0	..	0	1	35	To put on sheaf carrier.
								0	0	30	To lower machine.
								0	0	25	To remove stones.
								0	0	20	Do. Do.
								0	0	20	To remove some straw.
3	45	Howard.	1	42	2	..	..	..			Loose corn delivered with 56 sheaves.
4	216	McCormick.	1	16	6	7	..	..			17 sheaves untidy and loose.
											The corn was laid near a tree, the probable cause.
5	47	Howard.	1	30½	4	6	..	0	1	30	To clear machine.
6	255	Samuelson.	1	28	9	2	12	0	2	20	To put on dividing board.
								0	0	30	To adjust.
											Loose straw delivered with 41 sheaves.
7	217	McCormick.	1	41½	4	2	10	0	2	0	The twine twisted off the top of the strong box as a small ball commenced.
8	4569	Hornsby.	1	36½	8	2	0	0	0	15	Caught the ground.
								0	4	0	String entangled in the box.
								0	0	10	Caught ground.
											Used 3 balls of string.
											Very awkwardly shaped plot of ground.
9	381	Kearaley.	1	20	20	..	..	..			Had many pairs and loose pieces.
10	4570	Hornsby.	1	36	1	..	1	0	1	15	To set machine higher.
								0	1	20	To oil.
								0	0	15	To remove stones.
								0	0	10	Do. Do.
								0	0	35	Do. Do.
11	407	Wood.	1	20	6	..	..	..			Made several pairs and loose pieces in tangled part.
12	256	Samuelson.	1	23	..	..	..	..			Not in competition.
13	409	Wood.	..		5	..	..	..			Sheaves well bound and very few pairs or loose pieces.
14	215	McCormick.	1	48	13	44	..	0	2	0	To tighten string.
								0	0	30	Stone in knife.
								0	0	30	Knot in twine.
								0	2	30	Lost a washer off the platform wheel.
								0	2	0	String broke.
								0	2	0	To alter size of sheaf by order of the Judges.
								0	0	2	Reins broke.

“NOTICE.

Further trials of the following machines will be made in Barley Field No. 7. Machines to be worked in succession as under—

1. Hornsby	..	..	..	4569
2. Wood	..	..	..	407
3. Howard	..	..	..	45
4. Samuelson	..	..	..	255
5. Howard	..	..	..	47
6. McCormick	..	..	..	215
7. Hornsby	..	..	..	4568
8. Hornsby	..	..	..	4570

MORETON,
J. H. THOROLD, } *Stewards.*

August 12th, 1884.”

It had been previously determined that each of these machines, before going for further trial, should first be subjected to a run on the Dynamometer to test their comparative draught, which was done under the superintendence of Mr. Anderson, the Consulting Engineer to the Society. With this end in view, the knife of each machine was impounded on the completion of their respective two-acre plots of barley, so that the first run on the Dynamometer might be made with each knife in the condition in which it finished cutting. These trials commenced on Monday afternoon, and were, perhaps, somewhat marred by a drizzling rain, which came on soon after they were commenced ; nearly the same condition prevailed next morning. The corn, though not very wet, was sufficiently damp to add something to the power required to drive the machines.

DYNAMOMETER TRIALS.

In order to test the *comparative* draught of the selected machines, which had already gone through the ordeal of repeated trials, they were finally subjected to a dynamometer test.

The nature of such tests has been reported in former Journals, and they were similar on this occasion.

A portion of a field of wheat where the crop was most even was chosen. There was a fall in the ground in one direction ; so, to arrive at a fair estimate of the draught, each machine made two journeys up hill and two down hill.

Those machines using a serrated knife made no alteration in their knives during the trial on the dynamometer. Those with smooth-edged knives did their first run with the same knife as

TABLE V.—RESULTS OF DYNAMOMETER TRIALS OF SHEAF-BINDERS IN PLOTS OF WHEAT.

	HOMER, 4598.				HOWARD, 45.				HOWARD, 47.			
	Up Hill.		Down Hill.		Up Hill.		Down Hill.		Up Hill.		Down Hill.	
Distance Index	789	772	773	774	776	783	773	778	778	778	776	
Index Register	2170.0	1931.3	1692.0	1792.7	2232.7	2314.0	2018.1	2077	2215.7	2353.6	1932.1	2050.4
Index per foot run	2.75	2.50	2.17	2.23	2.87	2.95	2.61	2.67	2.84	3.00	2.48	2.64
Foot-lbs. per foot run (mean draught)	357.5	325.0	282.1	289.9	373	383	339	347	369.2	390	322.4	343.2
Maximum Side Thrust	15	13	12½	13	18	..	17	19	11	12	9	..
Width of Cut	5 ft. 0 in.		5 ft. 1 in.		5 ft. 2 in.		5 ft. 2½ in.		5 ft. 1½ in.		5 ft. 2 in.	
Number of Sheaves		193				227				222		
Weight of Sheaves	15.5	|	16.26			13.06				15.5		
Total Weight Cut		3065 lbs.				3100				3441		

TABLE V.—RESULTS OF DYNAMOMETER TRIALS OF SHEAF-BINDERS IN PLOTS OF WHEAT—continued.

	HORNBY, 4569.		HORNBY, 4570.		McCORMICK, 215.	
	Up Hill.	Down Hill.	Up Hill.	Down Hill.	Up Hill.	Down Hill.
Distance Index	780	752	776	776	778	764
Index Register	812.6	767.5	716.2	668.8	774.1	826.2
Index per foot run	1.04	1.02	0.92	0.87	994	819
Foot-lbs. per foot run (mean draught)	912	906	276	261	298.2	245.7
Maximum Side Thrust	10	12	..	9	23	20
Width of Cut	4 ft. 6½ in.	4 ft. 11½ in.	5 ft. 0½ in.	5 ft. 1¼ in.	5 ft. 0 in.	5 ft. 0 in.
Number of Sheaves	202		186		173	
Weight of Sheaves	19.22	21.4	20.16	19.88	17.58	17.5
Total Weight Cut	4102 lbs.		3714		3034	

TABLE V.—RESULTS of DYNAMOMETER TRIALS OF SHEAF-BINDERS IN PLOTS OF WHEAT—continued.

	WOODS, 407.				SAMUELSON'S, 255.			
	Up HILL.		Down HILL.		Up HILL.		Down HILL.	
Distance Index	787	788	777	775	785	780	770	765
Index Register	788.2	*846.0	638.5	632.2	952.1	912.4	761.8	759.2
Index per foot run	1.0	1.07	.82	.815	1.21	1.20	.989	.992
Foot-lbs. per foot run (mean draught)	300	321	246	244.5	363	360	296.7	297.6
Maximum Side Thrust	9	7	11	..	11	..	9	10
Width of Cut	5 ft. 2 in.	5 ft. 2 in.	5 ft. 4½ in.	5 ft. 4½ in.	4 ft. 10½ in.	4 ft. 10½ in.	4 ft. 11½ in.	4 ft. 11½ in.
Number of Sheaves	243				182			
Weight of Sheaves	13.36	13.36	14.06	14.06	16.38	16.38	15.53	15.53
Total Weight Cut... .. .	3331				2003			

* This reading is somewhat excessive, as on part of the run up hill the table of machine was lowered and rubbed on the ground.

they used in their previous trial, and the second run with a new knife. As, however, the main object to be obtained was to cut as much weight of corn as possible, it happened that when the widths of cut were measured, it was found that generally a wider cut was taken in the second round, the extra weight of corn cut and raised on to the binding table neutralising the advantage of the sharper knife.

The circumstances under which the three machines were tried on the first day varied somewhat from those on the second day, when it was found desirable to have an additional horse to the dynamometer, and a heavier spring was used. The conditions were somewhat more favourable on the second day. It would have been interesting to have repeated the first trials under exactly the same conditions as on the second day, but as the comparative test between these three machines first tried was complete, and that the decision of the awards rested between the machines in this group, it was not thought necessary to further prolong the trials.

At this stage of the proceedings a question arose as to the expediency of extending the trial of those machines remaining in competition to a further test of cutting beans. In accordance with the original programme of arrangements bean-fields had been secured, but Mr. Bowen Jones reported that they were some miles distant, that the crops were not ripe, neither were they good. The following circular was therefore sent round to the exhibitors:—

“The Stewards would be glad to know, before ordering the bean-fields to be opened, if those exhibitors whose machines may be selected for the final trial, would be content to dispense with the further test of cutting beans.

“MORETON, }
J. N. THOROLD, } *Stewards.*”

The exhibitors gave a unanimous assent to the proposal to dispense with the bean-fields.

After inspecting the remaining fields on Montford Farm at our disposal, we selected another barley-field, as the only one presenting greater difficulties than the machines had hitherto met. Clover and grass-seeds were growing with the barley; true, they were not strong, but about half of the field was very much lain and storm-broken, while a boggy piece was matted with a second growth, and had, besides, a number of mole-runs in it. The field was not opened out. Several scythes were set to work to cut the avenues; this was the worst lain part of it,

with the exception of the west corner near the wood, which was thought to be almost too bad to get through, but, as will presently be shown, was afterwards successfully attacked.

The Judges and Stewards agreed to give each machine four runs round this difficult piece—the machines to run consecutively; each machine was to be ready when its turn came to start immediately after the preceding machine had completed its fourth round. The Judges were thus enabled to see the whole of the work done by each machine.

Although the spectators were not so numerous, nor did they form so brilliant an assemblage as they did during the wheat and oat trials, when a number of ladies graced the trials with their presence, yet it was evident from the stir and excitement which was manifested, that those who were present realised that the decisive test had now come. Each exhibitor was informed that his machine would be allowed to go the first round without being noted, so that it might have its own cut to follow afterwards.

Hornsby, No. 4569, as already stated, was the first to go. This machine started at 1.18 P.M. after the track made by the scythes. The preliminary round being got through, in the first round noted there were several loose pieces between the sheaves and a good many pairs.

2nd round. Three loose sheaves, 2 sheaves half in band, stopped 1 minute in order to adjust threader.

3rd round. Sheaves were all tied, but occasional pieces of loose straw were left between. Work considered good on the whole. Time, 37 minutes.

Wood, No. 407.—1st round. Caught ground, went over corn, had to stop and clean; 1 loose sheaf, part loose pieces not in band; sheaves rather irregular.

2nd round. Stop caused by the finger-plate running over the corn. A stop of two minutes was caused by the cut corn collecting on the divider and platform, three armfuls had to be taken off by hand. The Judges agreed to dispense with the further trial of this machine at the end of the 2nd round.

Howard, No. 45.—1st round. Good work made.

2nd round. Too many heads cut off, and a little not in band. The elevator became choked, one sheaf had to be taken off by hand: a stop of two minutes was caused by fingers catching up a piece of leather.

3rd round. Caught stone in the fingers, had to take some grain off the platform to clear, but finished well. Time, 36 minutes.

Samuelson, No. 255.—1st round. Made some babies, sheaves a little irregular; stopped half a minute to clear the divider on the off-shoe on the platform.

2nd round. Made two loose sheaves; stopped 1 minute to clean the platform, three armfuls had to be taken off by hand; but the general work was good.

3rd round. Got through without stopping; took a rather narrow cut, two sheaves were somewhat rough.

Howard, No. 47.—1st round. Made good work, but some pairs. Got into mole-heap and choked at the off-point of finger-plate.

2nd round. Made very good work, raised machine a notch when she got into mole-workings, but had to put her down at once to get hold of the corn,

which was very flat in the short boggy portion where the mole runs were particularly bad. Two loose sheaves, but finished the round very well.

3rd round. A stone caught up by the fingers caused a momentary stoppage, but no other hitch occurred in this round, which was done in excellent style. Time, 32 minutes.

McCormick, No. 215.—1st round. Rather tangled delivery; cut over lying corn, choked and stopped, started and choked again. Cut not good, but made nice sheaves where the crop was good. Attendant had to clear off the straw which had been caught in the knoter.

2nd round. Three stops, owing to collection on the fingers of partly loose pieces of straw.

3rd round. Kicker brought sheaf round and choked; the machine was taken out of competition before completing this round.

Hornsby, No. 4568.—1st round. Some pieces not in band, a little straw scattered between the sheaves.

2nd round. One loose sheaf; good work.

3rd round. Two loose sheaves.

This machine made very good work all round; no stop or hitch. The cut was, however, getting rather out of the bog-land and the worst of the mole runs, both of which had been very trying to the preceding machines.

Hornsby, No. 4570.—1st round. Fingers picked up a stone, 1 minute's stop to clear.

2nd round. Fair work.

3rd round. Four untied sheaves, 1 minute's stop to take off the zinc cover to the thread needle. Made fair work all round, but not so good as the preceding machine. Time, 33½ minutes.

The Judges considered *Hornsby*, No. 4568, *Howard*, No. 47, *Hornsby*, No. 4570, and *Samuelson*, No. 255, to have made the best work in these consecutive barley trials. It was determined to take each of these four machines twice round the same plot of barley.

Howard, No. 47, in the first round made 1 loose sheaf, and stopped in a rabbit-hole.

2nd round. Made 1 loose sheaf, some ears were cut off through inefficient dividing, but it made otherwise very good work indeed.

Hornsby, No. 4568 :—

1st round. A little straw left out of the band in rough places.

2nd round. Made one loose sheaf, and excepting in the roughest patches, where a little straw was left out of the band, made excellent work.

Samuelson, No. 255, made 4 loose sheaves; in returning, the elevator and delivery-board became choked full, and tight, which took some time to clear by hand. Further trial was dispensed with at the end of the first round.

Hornsby, No. 4570 :—

In the first round two stops occurred, but the machine simply backed on each occasion and went on.

2nd round. No hitch occurred; sheaves not so tidy as they might have been, but good work was made on the whole.

It will have been observed that throughout the whole of the trials *Hornsby's* machine, No. 4568, and *Howard's*, No. 47, had

each distinguished themselves by making good work in every plot on which they were engaged. In the barley trials their superiority became even more apparent. As the trials became more exhaustive, the ability of these two machines to grapple with increasing difficulties became more marked.

After some deliberation the Judges concluded to send the two rival machines—which from their previous training had now developed their best form—into the plot near the wood at the west corner of the field, which has been already referred to as being too rough to attack. This was indeed a crucial test, but its application confirmed the opinion which the Judges had by this time formed of the splendid capabilities which these two machines possessed for executing the work for which they were designed. All their appointments were as perfect as the combined ingenuity of the large body of retainers present belonging to the respective firms could devise. It was a fine sight! The head of each firm, like a commanding officer with his troops on parade, was mounted on his favourite charger. Hornsby's pair of black horses, with Trollie's well-known form on the box, were simply immense. Howard's high-stepping mares, though not quite so heavy, fully made up for this by their extra activity. They all stood ready for the fray to begin, surrounded by a large body of eager spectators. This portion of the field was only partially opened out. It fell to Mr. Howard's lot to go first; and the machine, rising to the occasion, "opened out" her own track with apparently much less waste than when this is done by the scythe. In the two rounds made by this machine no hitch occurred, except a stop which was caused by the cutting up of a hedgehog, but with this the machine could not be charged. Every sheaf was tied, and, though some severe critics might have found a handful of the battered grain passed over uncut, the general work was excellent. Hornsby's machine, No. 4568, went round first as a preliminary, then made the two trial rounds without a single hitch, making splendid work throughout.

The work done by the two machines on this patch could not fail to excite the admiration of every one who saw it. On one portion the grain was laid nearly straight away from the cut of the machines, but these same machines managed to shave nearly the whole of this off by the earth, sweep it on to the platform, and finally turn it off in well-bound sheaves. With this crowning triumph these most exhaustive trials were fittingly concluded.

The Judges retired to the Stewards' tent, and the following unanimous award was at once posted:—

"The first prize of 100*l.* to Richard Hornsby and Sons, Limited, of the Spittlegate Iron-works, Grantham, for their Sheaf-binding Reaper, No. 4568.

"The second prize of 50*l.* to James and Frederick Howard, of the Britannia Iron-works, Bedford, for their Sheaf-binding Reaper, No. 47."

This question will now doubtless arise to many readers of this Report: "Has the sheaf-binding reaper at last attained to that degree of simplicity and perfection which would make it a safe thing for me to buy one for next harvest?" I do not attempt to answer the question. There may be room for greater simplicity and for further reduction in price, but I am free to state that the sheaf-binder *can* now cut and tie an average crop of grain in a manner superior to any other process of cutting and tying that I have yet witnessed. The machinery for elevating and binding is no doubt somewhat complicated; but on this point there is not, in my opinion, anything approaching the difficulty which was present to the ordinary agricultural mind when manual and self-delivery reapers were introduced.

It may here be noted that those corners of the trial-fields which did not form part of the trial plots were cut by Mr. Minton's self-delivery reaper, and tied in the usual way by hand. The work done in this way presented a woefully ragged appearance when compared with the clean and trim adjoining work made by the self-binders.

My respected colleagues, Mr. Mason Cooke and Mr. Wm. Scotson, with myself, would be lacking in our duty if we failed to express our satisfaction with the courtesy which we received from the exhibitors and the whole of their attendants during the trials, and also to the exhibitors for the descriptions and illustrations of their machines, many of which have been utilized in this Report. To the Assistant Engineer (Mr. Courtney) we are particularly indebted for much technical information and assistance; and we desire also to take this opportunity of conveying our thanks to the Secretary, the Stewards, and the Consulting Engineers, for their unfailing attention to our varied requirements, whether expressed or understood.

II.—*Sugar as a Food for Stock.* By Sir J. B. LAWES, Bart., LL.D., F.R.S.

THE very low price of sugar at the present moment has naturally attracted the attention of agriculturists, and such being the case, it is certainly desirable, and at the same time may be useful, that its feeding properties should be more generally known. In a Liverpool price current I find the following

quotation, "Refined Sugar continues in fair demand for cattle feeding at 10*l.* 15*s.* to 11*l.* 5*s.* per ton."

It is now exactly thirty years since I read a paper before the British Association for the Advancement of Science on the equivalence of starch and sugar in food. At the period to which I am alluding there was a considerable duty upon sugar, and one object of the experiments was to ascertain whether its feeding properties were sufficiently great to justify the farmer in making large use of the duty free sugar.

The experiments were carried out upon pigs, which were fattened with starch and sugar, mixed with limited quantities of other foods. Before referring to the results obtained, I propose to make a few observations on food in relation to man and animals. If we compare the size of the stomach of a man with that of the domestic animals, it will be found that the former requires a comparatively concentrated food, and that there is not the space, nor does man possess what may be described as the necessary machinery, for extracting the food element from a large amount of indigestible matter. At Rothamsted I find that my cows consume about 100 lbs. of solid (not dry) food daily. The weight of nine men would be about equal to that of one cow; one man would therefore have to eat 11 lbs. of solid food daily in order to consume as much as a cow. There is no better food for an ox or a sheep than a first-class pasture, and yet a man could not support life upon grass. It might be possible by some chemical process to produce from grass a nutritious substance which a man could use as food, but the food so extracted would be far more costly than as it existed in the grass, and no one would think of preparing such a food for oxen or sheep, as their machinery is quite competent to separate the nutritious from the indigestible portion of the food.

A farmer who feeds stock for profit should exercise a considerable amount of judgment, as well as caution in the selection of their food. He should bear in mind that all processes of manufacture increase the cost of a food. Look, for example, at the extraordinary amount of mechanical and chemical skill which has been brought to bear upon the grain of wheat in order to produce a loaf of bread. A little coarse grinding, or even a few hours soaking in water, is all that is necessary to adapt the wheat to the requirements of the animal stomach. It is true that we purchase the bran and pollard for our stock, but it is as waste products; we do not pay the cost of their manufacture, and if there was no sale for these products they would have to be thrown away. In a similar way—as I pointed out many years ago—linseed, cotton, and rape cakes are waste products;

they would be manufactured just the same whether farmers purchased them or not, and the price at which they are sold is neither more nor less than what the competition between farmer and farmer enables the maker to obtain.

Linseed must be a cheaper food for stock than the oil and the cake manufactured out of linseed, assuming they were used together as a food; and unless the maker could find a sale for his oil for other purposes than as food for stock, his business would come to an end. In all questions, therefore, relating to the economy of food, it is most important to distinguish between a food which is the residue of some manufacturing process, and one which is manufactured as a food only. The process of manufacture, while it adds to the cost of the material, does not necessarily add to its feeding properties.

If sugar and sugar-beet were both foods which could be purchased in the market, there could be very little doubt regarding the greater economy of the beet as a food for stock; for a certain amount of loss in the sugar takes place in the process of manufacture, and the cost of the manufacture must also be paid.

With the exception of locust beans, there is no cattle food in the market which contains any large proportion of sugar, while almost the whole of the substances with which sugar, as a food, must come into competition, contain large quantities of starch; and, in consequence, the inquiry referred to was directed almost exclusively to the relative value of sugar as a food compared with starch.

Here I may mention, that however valuable both starch and sugar may be as foods, neither one nor the other could sustain life if used alone. It is necessary therefore, in the case of experiments carried out for the purpose of testing their food value, to use some substance which supplies the ingredients in which the starch and sugar are deficient. Lentils and bran, in relation to the starch which they contain, are very rich in the nitrogenous element of food; these two substances were therefore selected for use in the experiments with the starch and sugar. I also selected pigs, as more suitable animals than oxen or sheep, from the fact of their having a wonderful power of increase, if furnished with plenty of good food. When fed with barley meal—which I might call the natural diet of civilised pigs—they will increase in weight by about 1 lb. to each 4 lbs. or 5 lbs. of meal.

Having thus selected the pigs as the most suitable animals, and lentils and bran as the most suitable foods to be used with the sugar and starch, the experiments were arranged as follows:—

- (1) A fixed amount of bran and lentils, with sugar *ad libitum*.
- (2) Ditto ditto with starch *ad libitum*.
- (3) Ditto ditto with equal parts of both sugar and starch *ad libitum*.
- (4) Lentils, bran, sugar, and starch, all *ad libitum*.

I do not know how an experiment could be arranged which would be better adapted to ascertain the relative value of starch and sugar. In the following table will be found the summary of the results, as well as the remarks upon them.

FOOD CONSUMED.

	Pen 1.	Pen 2.	Pen 3.	Pen 4.
	lbs.	lbs.	lbs.	lbs.
Lentils	672	672	672	918
Bran	126	126	126	47
Sugar	388½	..	286½	446
Starch	..	450½	292½	51
Total	1186½	1248½	1377	1462
Increase of live-weight	247	248	272	312
Dry matter of food	1056½	1055	1196	1300
Dry organic matter	1017½	1017½	1156½	1254

It is a sufficiently remarkable fact in relation to the main object of this investigation—that is to say, the question of the equivalence of starch and sugar in food—that with three pigs in each case, the experiment extending over ten weeks, and the *ad libitum* starch or sugar, constituting one third of the total food, there should be in Pens 1 and 2—in the former with sugar and in the latter with starch—absolutely identical amounts of *dry organic substance* consumed in both cases; and also, within one pound, the same amount of gross increase in weight yielded by it.

It thus appears that, whether for the purpose of supporting the functional actions of the body, or of ministering to the formation of increase—for, as will be seen, the rate of increase was in both cases good—these two substances, starch and sugar, have, weight for weight, values almost identical.

It is hardly necessary for me to make any further quotation from these experiments. I would, however, point out that in Pen 4, where the pigs could select from the four foods what they liked the best, they took very little starch or bran, and almost confined themselves to lentils and sugar. This diet, though it pleased their palates, could produce but little more increase upon

their weight than the starch, and what little there was is clearly due, not to the selection of sugar rather than starch, but to the rejection of the bran. Starch and sugar therefore, as foods, appear to be equivalent; or, in other words, a pound of one, properly used, can produce no more increase in our stock than a pound of the other.

If we turn from experiment to practice, it will be found that sugar does not possess the high feeding value which is sometimes attributed to it. The greater portion of the dry substance of mangolds consists of sugar. At the Liverpool quotation the sugar alone in mangolds would make their feeding value 17*s.* per ton, which is a far higher estimate than most farmers would like to place upon them. Swedes are generally considered quite as good a food as mangolds, if not better, weight for weight; and yet swedes contain less sugar than mangolds, and their consuming value is rarely estimated at more than 7*s.* or 8*s.* per ton. Sugar beet contains about 12 per cent. of sugar, which, at 11*s.* per cwt., would make the sugar in a ton of beet worth 27*s.*, and yet some farmers in Suffolk were willing to sell their beet to the Lavenham Sugar Factory at 21*s.* per ton; and this, though the beet-roots—in addition to the sugar—contained other valuable substances, such as nitrogen, potash, and phosphates.

Granted that a somewhat exaggerated value has been placed on sugar as a food for stock, still there is no doubt that it is an excellent food: the only question therefore is this, At what price should a farmer buy sugar as compared with other foods in the market?

Although we may not know what is the most healthy balance of the various constituents of food to be given to our stock in their various stages of growth and fattening, still there are certain limits beyond which we may feel sure that food will be wasted. The pigs in my experiments, which were allowed to select what they pleased out of the four foods:—lentils, bran, sugar, and starch—consumed more of the highly nitrogenous lentils than the quantity which had been allotted to the pigs in the other experiments.

The relation of the nitrogenous to the non-nitrogenous food in this experiment was higher than it is in barley. I think, therefore, we may safely conclude that sugar should not be used in any quantity with the cereal grains, or with maize, rice, roots, or even with meadow hay. All these substances are somewhat low in nitrogen, and to dilute the nitrogen that exists still more by the use of sugar would tend to waste it. On the other hand, the leguminous seeds, especially lentils, tares, and beans, and such foods as linseed-cake, cotton-cake, and clover-hay, contain a relatively large amount of nitrogenous substance, which might be safely diluted with sugar.

In comparing the value of sugar with that of other foods in the market, it is somewhat difficult to arrive at their actual composition; for instance, I found that the starch used in the Rothamsted experiments contained 20 per cent. of water, while the sugar only contained 3 per cent. Generally speaking, the ordinary dry foods in the market contain about 14 per cent. of water, and for practical purposes the deduction of one seventh of the weight would be sufficiently accurate. The present price of lentils in the market is 5*l.* 15*s.* per ton, and beans may be purchased at about the same price. Assuming that sugar and beans, or sugar and lentils, were used in the proportion of one of sugar to two of the other foods, the mixture would cost about 7*l.* per ton. When ordinary barley can be purchased at 4*l.* 10*s.* per ton, and Rangoon rice-meal at 3*l.* to 4*l.* per ton, it would appear that sugar is too dear to compete with starchy foods at their present extremely low prices.

There is another point in regard to the use of sugar which is somewhat important. I refer to the attractive character of the substance amongst all those who work on the farm. To ensure the animals their full modicum, it would require the eye of the master to be very close to his stock when their food was given to them.

In the case of animals which are off their feed, or to induce animals to eat their food which they would otherwise reject, sugar may probably be useful, but in such cases every one must use his own judgment. As a food for healthy stock, even at its present low price, sugar does not appear to be an economical substance to use, when brought into comparison with other foods which are available to the farmer.

III.—*Franco-Swiss Dairy-Farming.* By H. LING ROTH.

LAST summer I spent several months at Divonne, a watering-place in the department of the Ain in France, close to the Swiss frontier. I was interested in the peasantry, and this paper is the result of my investigations into the dairy-system of portions of that department, and of the adjoining Swiss cantons of Vaud and Geneva.

The soil is partly heavy and impermeable on a limestone bottom; and partly a light soil on gravel, easily dried up.

From the permanent meadows three crops are obtained. The first towards the end of June; the second, called the *regain*, cut towards the end of August; a third, called the *paquis*, which is eaten off during the six weeks from the beginning of September to the middle of October. There are a large number

of water-meadows, but, generally speaking, those belonging to the peasantry are badly drained, with an exceedingly coarse herbage, much moss, and plenty of meadow saffron. Water is, wherever possible, conducted to the meadows for irrigation purposes; and occasionally the urine from the stalls and the wash from the manure heaps are mixed with water and carried to the fields. In most cases the manure is wastefully exposed to continued washings by rain, and much valuable matter is lost. Farmyard-manure is reserved for the vineyards, and rarely finds its way to the meadows, although I have seen it carried thither. An artificial fertiliser is commonly used by the peasants for the meadows; they say it is very dear; they neither know of what it consists nor what it is called, giving it the general appellation of "chemical fertiliser." I did not succeed in seeing any, but from the descriptions given, it is probably some bone preparation. The large proprietors use superphosphate.

It is curious to see kitchen-gardens in the midst of meadows, without any partitioning fence. The hedge-rows are numerous, and they occupy too much of the already limited space; but if anything is done to them it is to pull them up. Beyond what is necessary for their own immediate consumption, the peasants grow very little wheat or hemp,—the rotation of crops on the arable land being chiefly two cereal crops followed by one of potatoes, and occasionally one of clover. Rye is grown solely for the sake of its straw to bind the vines. Large proprietors grow maize and lucerne, which are given green to the cattle. At Marnex, near Commungy, the farm consists of 35 acres, of which $27\frac{1}{2}$ are under meadow, 5 under cultivation (wheat, potatoes, oats, clover, &c.), and $2\frac{1}{2}$ under vines. This may be cited as a fair example of the relative proportion of land under meadow and cultivated land.

The area under meadow necessary for making hay for the keep of a cow all the year round varies from 4 to 5 acres; but where peasants or farmers send their cattle to the mountains for the four summer months, they only require a little over two acres and three quarters for their keep during the rest of the year.

Going through the villages, or passing a farmstead, one is astonished at the extraordinary and apparently disproportionate sizes of the farmhouses in comparison with the area of the farms. These dimensions, however, are due to the fact that all cattle, utensils, and fodder, as well as the dwelling-apartments are placed under one common roof, there being no barns, store-houses, or byres apart from the one large building. The plan of a peasant's or farmer's house may be said to consist of a central archway, on either side of which the apartments are grouped.

This archway runs the whole length of the building; on the left-hand side are the kitchen and dwelling-rooms, and on the right-hand side the byre, running parallel with the archway; beyond the byre are the store-rooms. Occasionally there are byres on both sides of the archway, so that the racks can be easily filled from outside the byre, that is from the archway, without disturbing the animals.

The hay is brought in from the meadows as soon as it is dry enough to bear removal, and is never stacked out in the open. The cart is run under the archway, and the hay thrown up through an opening (a tedious operation), and densely packed in the granary, which consists of the spare space above the kitchen and byre.

The smallest byre I have seen was capable of containing five head of cattle, and a peasant who has that number is considered well to do. One who has eight cattle or more is a rich man. On the other hand, a peasant who has only one cow or a goat is considered poor, and there are peasants who possess no cattle at all, in consequence of not having sufficient land whereon to feed them.

The physiography of the country, and to a large extent the influence of peasant proprietorship, have made cattle raising and milk production the chief business of the inhabitants. The object of the peasants and other proprietors and cow-keepers in general is to obtain a breed which has fair milking qualities combined with a useful frame for laying on meat. To this end some Swiss landed proprietors have introduced a few bulls of Shorthorn origin, but they find that a cow should not possess more than one-fourth of this cross.

The cattle bred by the peasants are considered native to the country, but they are largely leavened by degenerate Simmenthal as well as Fribourg crosses, and poorer Berne and Schwyz cattle are not absent. In fact, the cattle are everywhere very mixed, and their beauty and quality are exaggerated by the peasants. It may fairly be said that the cattle are rather Swiss than French.

Four or five years ago, a Herd-book was established for the adjoining Canton de Vaud, and some of the large proprietors have gone in for pedigree stock, and have taken great pains and care with breeding; but by the peasantry there is nothing done in this respect.

The establishment of a Herd-book will in time not only improve the large proprietors' stock, but also that of the peasantry; and as the peasants together are greater cattle-raisers than the gentry, the improvement will be very general. The

owner of a bull, who is probably a wealthy peasant, usually charges one franc (ninepence halfpenny) for service. In a few villages the community combine together and buy a good bull, which serves sixty cows; for the service of every cow four shillings is paid. This rate does not pay expenses, and the subscribers have to make up the difference. Thus, only comparatively rich peasants are able to co-operate, and it remains to be seen whether the system will extend. On the French side of the frontier I saw no co-operation of this sort.

Purchasers from the south of Germany come to this part of France, and annually take away many cows, which are probably sold in the Fatherland as Swiss bred.

The milk is disposed of by means of communal dairies, introduced at the beginning of the century from the remoter parts of Switzerland. The villagers form themselves into a Society, erect a dairy, and engage a dairyman to make cheese and butter at the fixed wage of 250 francs (10*l.*) per annum, with perquisites, or 100 francs (4*l.*) for the winter season, lasting from the 9th of October to the 31st of May. A register of the milk sent daily, morning and evening, to the dairy is kept; and he who on any morning has the most milk to his credit takes the cheese, butter, butter-milk, &c., as well as the cash for milk sold and cheese made from all the milk brought in by the members for that morning and the previous evening. On the following day, the next man who has the most to his credit receives all the produce and cash.

As the cheeses are not taken away at once, but left in the dairy to be pressed and cured, a little numbered wooden label is fixed on the side of the cheese as soon as it is made into shape,—the number on the label tallying with the owner's number on the register.

This is the old Swiss system, and is, no doubt, well adapted for cheese-making, and thus utilising the milk in a more profitable way than the peasants individually would be able to do. But it has been found that the poor man who only sent a little milk daily to the dairy, had to wait a long time for his quantum to accumulate until it stood highest on the register, and he thus occasionally did not get any return from his cow before the end of the season. This objection, added to the not infrequent difficulty of obtaining a good dairyman, has brought about a modification in the dairy-system on the Swiss, but not yet on the French, side of the frontier. Instead of the village community engaging a dairyman to work for wages, they make a contract with one who buys the milk from the members of the community at a fixed rate (13 to 14 centimes per litre = 5½*d.* to 6½*d.* per gallon), and who pays cash fortnightly or monthly.

Such a dairyman disposes of the butter and cheese he makes at his own risk.

The dairies, as they exist at present, are very old buildings. The Society consists of the original peasants who subscribed to the building fund, or of their descendants. The rate for paying the annual expenses is levied on the cheese produced, and may be said to average nine centimes (nearly a penny) per pound; and of course every member only pays on the quantity of cheese which is his share. The peasants who belong to the Society are not bound to send their milk to the communal dairy; but at the beginning of each season, that is to say, on the 1st of June and the 9th of October, they must declare whether they intend to send milk or not, and having once decided to send, they must continue to send the whole of their milk for the season, except that required for home consumption. They are not, under any circumstances, allowed to sell milk at the same time as when they are sending any to the dairy. Owners of cows who do not belong to the Society are allowed to participate in its privileges, and they have to pay a slightly higher rate towards the expenses, namely, about two centimes per pound of cheese made, more than a member. The following case of a breach of the rules came under my notice: it was found that a non-member was selling milk at the same time that he was sending milk to the dairy; he made a profit on his sales, and bought other milk to replace that which was thereby withdrawn from the dairy, in order that the Society should not suffer. Nevertheless, he was fined 20 francs (16s.), which is considered a mild fine, and was debarred from ever again having any connection with the Society.

From what has been said, it will be obvious that the depasturing of the mountain herbage by the cattle during the summer plays a not unimportant part in the production of milk, and in the general receipts obtained from the cows. The summer, or mountain-pasture, season lasts from the 1st of June until the 9th of October, the fête-day of Saint Denis; the valley, or winter dairy, system from the latter date to the time of ascending the mountains on the 1st of June again.

The 9th of October has been fixed in an arbitrary manner, probably owing to the old-fashioned system of fixing events on Saints' days, such days having been then more readily observable by people who had not learnt the use of the almanack. It appears now that the authorities of the Canton de Vaud have decided that the 9th of October is too late for the cattle to remain profitably on the mountains, and have accordingly fixed the date of descent for the 1st of October. On the French side the peasants say that if the cattle are brought down nine days

sooner the cost of food will be increased for that period. At that time of the year they are very busy in the vintage and in harvesting the potato-crop; they are always short-handed, and to bring down the cattle earlier than necessary means a useless augmentation of their work. The peasants have already experienced this difficulty, when, in consequence of a very early fall of snow on the mountains, they were forced to bring down the cattle before the 9th of October. On the other hand, by the end of September the grass on the mountain pastures becomes scanty and thin, the yield in milk falls off considerably, and the cattle lose perceptibly in condition.

The mountain system may be described as follows:—On Mount Jura, chiefly on the western slope and on the northern and southern extremities, where the declivities are not so steep and not so thickly covered with forest as on the eastern side, there exist large patches of pasture. These pastures, interspersed with rocks and clumps of wood, grow very good natural grasses. Their proprietorship is divided between private individuals and village communities, who let them on six years' leases, with power to the lessees of determining their tenancy after three years. The proprietors divide the land into blocks, varying from fifty to about sixty acres in extent, the division being made by means of primitive stone walls about three feet in height. In a convenient position a chalet is erected, its construction being always, more or less, on the same principle. The walls are of stone, and the roof of timber and shingles; about one-third of the building, rudely paved, is occupied by the actual dairy, and this, again, is divided into the dairy proper, where the milk is set or the cheese is kept, and the other where the cheese is actually made. The other two-thirds of the building are roughly floored with timber, with railings running across, to which the cows are attached when being milked. In some cases there is a small division used as a piggery. Where there is a very large pasture, or where two pastures are joined together so that there are two chalets at the disposal of the lessee, one chalet is then almost exclusively used as a store-house for the cheeses.

The chalet and the walls of the pasture are nominally kept in repair by the landlord, but practically the repairs fall upon the lessee.

The lessee is locally called an "amodier." The amodier hires the pastures entirely for feeding off the grass by cattle, and under the terms of his lease he is not allowed to make hay, either to be eaten in the mountains or to be carried away. Nevertheless, as the past season has been a dry one in the valleys, and hay has been required down there, the amodiers have, in certain exceptional cases, been allowed to make hay

and to remove it; and in other cases, equally exceptional, to make hay and feed their cattle on the mountain for some weeks longer than usual. Soon after the beginning of October the cattle require shelter and house feeding, hence the latter arrangement is not often feasible.

The amodier is allowed as much firewood as he requires, certain trees and bushes being marked annually for his use.

The rent of a chalet does not vary so much with the size as with the quality of the pasture. The ground belonging to a chalet may be very extensive, but at the same time there may be very little pasture on it, on account of rocks, declivities, and forests; the rent also depends much on the state and length and steepness of the roads which lead up to it, as well as upon the quality of the grass and shelter from prevailing winds.

All the pastures, if not possessing springs, are supplied from artificial sources; the water from wells is raised by means of pumps supplied by the landlords. Occasionally there appears to be a lack of water, and this is sometimes overcome by means of earthenware piping used to convey water from springs at a higher level.

When an amodier has obtained a block or two of pasture, he goes about among his neighbours to get cattle. For a block of 500 acres about one hundred and fifty cattle may be considered necessary. If the block is not well stocked, the grass does not get well eaten down, but grows coarse and hard, the result being that the cattle do not give the proper quantity of milk. If, on the other hand, the block is overstocked, the yield of milk is not up to the mark in quality or quantity. The amodier pays for the use of the cows, and is paid for the agistment of calves, steers, &c. For the use of the cows for four months the amodier pays from sixty-five to eighty francs (fifty-two to sixty-four shillings) per head, and for the other cattle he is paid from ten to twenty francs (eight to sixteen shillings) per head. For some cows the price is fixed in advance, and for others after the close of the season, when their milking capabilities are known.

If a cow drops a calf on the pasture, that calf belongs to the amodier and not to the proprietor of the cow. This arrangement is made in order to compensate the amodier for the loss he sustains in the milk. If the cow, however, is likely to calve immediately on leaving the mountain, the amodier allows her owner to remove her before the specified time.

On a pasture carrying eighty cows, or under, one bull is kept; the amodier being obliged to keep him for the use of cows, and does not receive anything for his services.

The farmer sustains the loss arising from the death of any

of his cattle on the pastures. The amodier must hand over to him the hide, and some fair arrangement is come to for payment on either side as the case may be. Loss by death is, however, rare, and other losses are guarded against by the boundary walker, who drives the cows up to the chalet night and morning, and who soon "spots" a stranger or a missing beast. Occasionally cattle are killed by lightning, and in such a case the blow generally falls on a single farmer. During a thunder-storm the cattle take refuge under the pine-trees; and as the cattle of the separate farmers usually herd together, if a tree is struck, those below it all succumb together. I heard of one case where eight head of cattle had all been thus destroyed. Pleuro-pneumonia has at times committed great ravages, and on whatever block it makes its appearance the whole of the cattle there are immediately slaughtered. About ten years ago the disease occasioned great loss; but the Government indemnified the owners to a certain extent.

As in the valleys, so in the mountains, the cattle are not by any means pure bred. The degenerate Simmenthal, or, as they call it, the native race, predominates; but there is a large admixture of Fribourg cattle, and of others which it is impossible to describe. Cattle are branded on the horn, not with the owner's brand, but with that belonging to the village community; thus, if on the pastures or elsewhere an animal is found, the community, through its mayor or secretary, posts a notice to that effect; there are, however, rare occasions for this action.

The cows are milked twice a day; the milkers are supplied with a little wallet containing salt, of which they give a handful to every cow after milking her; attached to the wallet is a little cup containing a preparation of curd and whey, locally known as "cail."

The number of hands required upon a mountain pasture varies with the number of cows. For seventy to eighty cows, together with more than an equal number of mixed cattle, five men are employed. The chief (or dairyman) receives 300 francs (12*l.*) for the season, and the four men under him 100 to 120 francs (4*l.* to 4*l.* 16*s.*) a-piece. The wages are higher in a mountain than in a village dairy, because there is more to do. The men are all fed. Their food consists of the produce of the dairy, with vegetable soup, wheaten bread, and occasionally a little rice or other extras; unlike their meals in the village, the men seldom get any pork or other meat on the mountains. They sleep about the byre or dairy as they can. The chalet and its surroundings are exceedingly dirty, although the utensils are kept exquisitely clean; nevertheless, it is a matter for astonishment that such splendid butter and cheese can be produced

when everything is so surrounded with filth. Pigs are kept, and, strange to say, they are cleaner than the cows; the cattle get washed now and again by the rain, but they are not taught to keep themselves clean.

The chief dairyman makes the butter and cheese; of the other four men, one is the boundary walker, and the rest are general helps. They all milk the cows.

The whole of the mountain cheese is sold in one lot to one of the many purchasers who annually make a tour in this district. The amodiers are obliged to sell in one lot, as merchants will not buy small parcels, on the plea that the first-comer picks out the best cheeses, leaving the worst for those who come after him. The cheeses are nearly all made of whole milk, little butter being produced beyond that required for the amodier's family. A higher price is obtained for mountain cheese than for what is made in the villages. Very good butter is made, and could be manufactured in large quantities; but an objection lies in the prevailing fact that the peasants like to be partly paid in butter for the use of their cows; the amodier has also to supply the butter to them at 10 centimes (1d.) cheaper than it can be sold at wholesale in the market; or 1 franc 35 centimes instead of 1 franc 45 centimes per kilo, which means about 6d. to 7½d. per lb. avoirdupois. The cheeses weigh from 50 to 90 English pounds each; they are salted every day, and take from five to six months to cure. They are sold in the market under the name of Gruyère. They are removed immediately on the close of the mountain season, hence the purchasers finish the curing themselves.

The value of a cow on the mountain is gauged by her milk, which is weighed three times during the season; and for every kilogramme (2½ lbs.) of milk obtained per day, 6 francs (4s. 9½d.) is paid for the hire of the cow.

Thus, if a cow when gauged gives 9 kilogrammes of milk in the two milkings for the day, her value for the four months would be 54 francs (43s. 2d.). It must be remembered that on the mountains cows give more milk than elsewhere.

The account of one chalet visited would stand for this reason approximately as follows:—

EXPENDITURE:—							Francs.
Rent	..	..	..	..	..	..	2500
Dairyman	..	..	..	..	..	..	300
4 men averaging 100	..	..	..	..	..	..	400
73 cows at 73·50	..	..	..	..	..	..	5365
Sundries (salt, &c.)	..	..	..	..	..	..	300
20 pigs	..	..	..	..	..	..	400
Total							9265

RETURNS:—

100 cattle at 20 francs	2000
11,290 lbs. cheese, at 68 centimes ..	7677
20 pigs at 75 francs	1500

Total	11177
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Net return	1912 francs
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equal to 76*l.* 9*s.* 7*d.*

The amodier of this chalet had five cows of his own, for the use of which, had he not been an amodier himself, he would have received three hundred francs from another lessee.

The above may be considered the average profit on a chalet with 173 head of cattle for the four summer months. To a certain extent American competition reduced the price of pork, but last year the pork market recovered itself. The Swiss have, during the last few years, made great efforts to improve their pigs, and much English blood has been introduced,—the Yorkshire breed seeming to be the favourite.

The produce and annual value of a cow are as follows:—

M. Aimé Sens, at Belle Ferme (Celigny), with well-bred cattle, fed on hay from good pasture irrigated during dry weather and fertilised from a stable-refuse tank about November each year, obtains on an average 2555 litres (567½ gallons) in the year, equal to seven litres per day.

Peasants' cattle, however, give much less, and the total produce in milk of one of their good cows is about 1800 litres (400 gallons) per annum, and then the cows are fed with a certain quantity of sesamé cake in the winter. It will thus be seen that the yield of the cows is not very great.

For the hire of a cow during the mountain season she will average 60 francs (48*s.*); her calf, when three weeks old, will also generally fetch 60 francs, and if she is only a tolerably good cow she will make 200 lbs. of cheese, which, at 65 centimes, equals 130 francs (5*l.* 4*s.*); for milk given to the young pigs, the butter she produces, and milk sold, 100 francs (4*l.*) may be put down as a fair value, making up a total of 350 francs (14*l.*), or about 9½*d.* a day. This represents the daily value of a cow in the country on the French side. On the Swiss side, where the milk is actually sold to the dairyman, the accounts stand somewhat like this; 1800 litres at 13½ centimes gives 243 francs; add to this 60 francs for the calf, and we have a total of 303 francs (12*l.* 2*s.* 6*d.*), or almost the same as with the French.

All the milk from the cows is not handled in the same way. At times more than I have mentioned is given to the young pigs, or the cow is not sent to the mountains for the summer, or

the milk is taken into town and sold direct to the consumers. Near the towns the whole of the milk is sent to a central dairy, and then sold at a price varying from 20 to 22 centimes (2 to 2½d.) per litre, according as the milk is fetched from the dairy or carried round to the houses. Thus 1800 litres would fetch 360 francs (14l. 8s.) per annum, or nearly 10d. a day.

IV.—*The Alteration in the Distribution of the Agricultural Population of England and Wales, between the Returns of the Census of 1871 and 1881.* By S. B. L. DRUCE, Barrister-at-Law.

READERS of the 'Journal' do not need to be told that the agricultural population of England and Wales was less in 1881 than it was in 1871. The fact was patent to most, if not to all, of them—or at least to all of them who live in the rural districts, and those to whom it was not thus patent have learnt it from numberless articles in newspapers and magazines that have appeared since the General Report of the 1881 Census has issued, rather more than a year ago. Nor is it necessary to dwell upon the fact that this decrease took place in spite of the increase in the general population of the country during the same period; an increase which was greater than in any other period of ten years, except from 1831 to 1841, during the present century.

Hitherto, however, although the decrease of the agricultural population has been so frequently commented on and discussed, yet, so far as I am aware, no attempt has been made to ascertain whether it was general, or equally distributed throughout the whole country; or whether it was confined to any, and if any, to what part of the country; or whether it was more extensive, and if so, how much more extensive in some parts than in others; or whether the decrease in any particular class of the agricultural population was greater or less than in any other class or classes of the same population. Nor, so far as I am aware, has any attempt been made, except in a very general way, to enquire into the causes which led to such decrease. The object of the present paper is to contrast the numbers of the agricultural population, returned in the Census of 1881, with the numbers returned in that of 1871, in order to ascertain how far the decrease thereby shown was general, and how it affected different parts of the country and the different classes connected with agriculture. If we can arrive at any definite conclusions in these respects, we may be able, perhaps, to determine with a

reasonable degree of accuracy, some one or more at least of the causes which brought about the general decrease.

I must ask my readers, in the first place, to allow me to state what I mean by the "agricultural population," and to explain the method which I have used to compare the 1881 Returns with those of 1871. By the "agricultural population" I do not mean the "Rural" as distinguished from the "Urban" population; nor do I include in that expression, as the Census Returns for both 1871 and 1881 include in what is called in them "the agricultural class," persons engaged in arboriculture, or horticulture, or persons engaged about animals.* I mean by the "agricultural population" those persons only who are engaged in, or directly connected with the cultivation of the soil for farming or pastoral purposes—in short, with agriculture proper—and no others.

The tables which I have prepared from the Census Returns in order to show the alteration in the agricultural population, as I have just defined it, in the several counties of England and Wales will be found in the Appendix, on pp. 113–126. It is unfortunate for the purposes of comparison that the sub-divisions of that division of the agricultural class, which comprises persons engaged in agriculture only, are different in the 1881 Census from the subdivisions of the same division in the 1871 Census. These differences will perhaps be most clearly appreciated by placing in parallel columns the subdivisions into which the agricultural division of the agricultural class (if I may use such an expression) was split up at each period, thus:—

1871.	1881.
Land proprietor (so returned).	Farmer, grazier.
Farmer, grazier.	Farmer's, grazier's son, grandson,
Farmer's son, brother, grandson,	brother, nephew.
nephew.	Farm bailiff.
Farm bailiff.	Agricultural labourer, farm servant,
Agricultural labourer.	cottager
Shepherd (outdoor).	Shepherd.
Farm servant (indoor).	
Land surveyor, estate agent.	
Land-drainage service.	Land-drainage service.
Agricultural-machine proprietor,	Agricultural-machine proprietor,
attendant.	attendant.
	Agricultural student, pupil.
Others engaged in agriculture.	Others engaged in, or connected with, agriculture.

It will be seen at once that the 1881 Returns differ from those

* The Census Returns include "gamekeepers," and even "fishermen" under this term.

of 1871 in four main points. (1.) There are no "land proprietors" returned in 1881, as there were in 1871. The reason of this was that the returns under this head in 1871 were found to be very incomplete and indefinite. Many persons were returned under this description and under other descriptions as well; and on the other hand, many persons who were proprietors of land did not describe themselves as such, but preferred to describe themselves under the occupation which they followed, or in some other way; and again, the special Return of the owners of land, which was ordered by the House of Commons to be printed in 1876, appeared to render it less necessary to include this sub-division in the Census of 1881. (2.) In 1871 there were two sub-divisions of agricultural labourers (excluding shepherds), viz. "agricultural labourers" and "farm servants (indoor);" but in 1881 these two sub-divisions were grouped together under the one head of "agricultural labourers, farm servants, and cottagers." With the view, therefore, of making a fair comparison between the numbers of the agricultural labourers at the two periods, I have, in my tables, added together the numbers under the above-mentioned two sub-divisions (both male and female) for 1871, and compared the totals so found with the numbers of the above-mentioned single sub-division (both male and female) for 1881. (3.) There is no separate sub-division in 1881 of "land surveyors and estate agents," but the persons who follow those occupations are included in the "professional class," and are grouped with house and ship surveyors. As I could discover no means of separating this group into its component parts, or of ascertaining how many persons in it were "land surveyors" only, I have been obliged to omit this sub-division entirely from my tables, and to leave it out from my comparison. This is, I think, unfortunate, for land surveyors, estate agents, and land valuers form in many parts of the country districts a by no means small class, and one which, as it seems to me, is increasing at a considerable rate. (4.) The 1881 Returns include a separate sub-division of "agricultural students and pupils," but the 1871 Returns do not. As no comparison, therefore, could be made of this sub-division, I did not retain it in my tables, but included the numbers which it gave in 1881 in the division which, in my tables, I have called, for brevity's sake, "Miscellaneous."

In considering my tables, therefore, I must ask my readers to be kind enough to bear in mind the foregoing differences between the Returns of 1881 and 1871. I must further point out that I have entirely disregarded the sub-divisions of "farmers' sons, brothers, grandsons, and nephews;" and that I

have not separately contrasted the sub-division called "land drainage service," but that I have included the numbers of that sub-division under the heading "Miscellaneous," in both 1871 and 1881. That heading therefore includes, in 1871, the persons who were returned under the sub-division "land drainage service," as well as "others engaged in agriculture;" and in 1881 the persons returned under that sub-division, and "agricultural pupils and students," as well as "others engaged in or connected with agriculture."

I have taken the area of "the Registration County" for the purposes of comparison, partly because that area was the most convenient, it being that by which the Returns of the various occupations are classified in the Census itself, and partly because that area seemed to me to afford better and fairer means of comparison than any other; it being on the one hand not too large, as the eleven "Registration Divisions" into which the country is divided would have been; and, on the other hand, not too small, as the 14,926 civil parishes, or the 2175 Registration sub-districts, into which respectively the country is divided, would have been. It must be remembered, however, that the counties in my tables are "Registration" counties, and that the boundaries of those counties are different in many cases from the boundaries of ordinary counties.

In the last column of the tables I have shown either the increase (+) or the decrease (−) in the numbers of each of the six classes into which I have divided the agricultural population in 1881 over or under the corresponding numbers for 1871; and in the last column I have shown the percentage of such increase or decrease.

Before proceeding to the consideration of my tables, it will be convenient to ascertain what was the alteration in the agricultural population of England and Wales during the period 1871 to 1881 from a general point of view, and for this purpose we can have no better guide than the general Report of the 1881 Census. The following extract from that Report relates to the Agricultural Class:—

Under the various headings that are placed together to form the agricultural class 1,383,184 persons were enumerated; which number showed, as compared with the total in 1871, duly corrected for comparison, a decline of 8·2 per cent. The agricultural class, however, comprises not only those who may properly be called agricultural, as being engaged in cultivation, but also 104,560 persons engaged about animals, many of whom, and especially the fishermen, are in no sense agricultural persons. The persons engaged in the cultivation of farm lands, including woods and gardens, numbered 1,278,624, and showed a decline since 1871 of 9·3 per cent.

In 1871 there were 249,907 farmers and graziers enumerated in England

and Wales. In 1881 the number had fallen to 223,943, a decline of 25,964, or of 10·39 per cent. It is true that in 1871 "retired farmers" were included in the reckoning, whereas this was not the case in 1881. But, as has been previously stated, the allowance to be made on this account is probably at the outside some two per cent.; so that the decline in the number of farmers was real and very considerable. Moreover, coincidentally with this decline in the number of farmers, there was a notable increase in the number of farm bailiffs. In 1871 these had numbered 16,476, but in 1881 they had risen to 19,377, that is, had increased nearly 18 per cent. These figures clearly point to the surrendering of farm-holdings by tenant farmers, and their cultivation by the owner himself or his bailiff.

As regards agricultural labourers, there was also doubtlessly a very considerable decline in the interval between the last two enumerations, but it is difficult to deal satisfactorily with this class, because of the confusion between agricultural and other labourers in the schedules. Special attention was called this time to the importance of carefully stating the exact kind of labour in the schedules, and, owing to this, the returns of agricultural labourers were probably more complete in 1881 than on any previous occasion. At any rate we may be perfectly assured that the returns were fully as complete as in 1871, so that any apparent decline in the numbers of this class of persons will be, if anything, below and not above the mark, if we take care to allow the 2 per cent. already mentioned for the omission in 1881 of retired or superannuated labourers from the account. Now, in 1871, the agricultural labourers, the indoor farm servants, the shepherds, and the persons returned simply as cottagers, amounted together to 981,988, or, after deduction of 2 per cent. for the superannuated, to 962,348, whereas in 1881 they numbered only 870,798. There was thus a decline of some 91,550, or of nearly 10 per cent., in this class of labourers. There was also a slight decline in another group of persons who may be regarded as an upper kind of farm labourers, namely, the sons, grandsons, and nephews of farmers, returned as living in the farmhouse and yet not stated to have had any definite occupation. These male relatives of farmers, who may be assumed to have been engaged in farm work, fell from 76,466 in 1871, to 75,197 in 1881.

This decline in the number of agricultural labourers was apparently not due to any falling-off in the amount of land under cultivation; for it appears from the Agricultural Returns that though the total acreage of arable land in England and Wales fell from 14,946,179 in 1871 to 13,977,662 in 1881, yet this decline was much more than compensated by an increase in the permanent pasture from 11,376,298 to 13,471,238 acres; so that the acreage of arable and pasture land together had risen from 26,322,477 in 1871, to 27,448,900 in 1881, an increase of 1,126,423 acres, or of 4·28 per cent. To what extent the exchange of 968,517 acres of arable land for 2,094,940 acres of permanent pasture would affect the amount of labour required for cultivation is a question which we must leave to agricultural experts.

Some small indication, however, of a reason for the decline in the number of agricultural labourers is perhaps to be found in the fact that the proprietors of, and attendants on, agricultural machines, who only numbered 2,160 in 1871, had increased to 4,260 in 1881, that is to say, they had doubled in number in the course of the ten years. Machinery had taken the place of hand labour. In 1871 the ratio of agricultural labourers of one kind or other to cultivated land was 3·95 labourers to 100 acres; in 1881 the proportion of labourers to the same area was 3·45, that is to say, the labour had diminished by 12·7 per cent. for like areas of cultivation.

Although general labourers are not grouped in the agricultural class, with which we are now more especially concerned, yet, inasmuch as there is

admittedly a certain amount of confusion in the Returns between general and agricultural labourers, it may be well to deal here with this group of workers, and it will be convenient to give a summary view of all such labourers as were abstracted separately.

	1871	1881.
	(Corrected numbers).	
Agricultural labourers	962,348 ..	870,798
General labourers	506,273 ..	559,769
Railway navvies and platelayers	44,169 ..	58,847
Road labourers	8,136 ..	10,947
	1,520,926	1,500,361

There is a considerable increase under each heading, excepting the agricultural, the general labourers having increased 10·6 per cent., the railway labourers 33·2 per cent., and the road labourers 34·6 per cent. The whole mass of labourers put together, exclusive of labourers in more specialised occupations, was 1,520,926 in 1871, and was 1,500,361, or practically the same, in 1881. Thus the class of labourers had remained stationary, while the general population had increased by 14·36 per cent.

Had the labouring class increased in the same ratio as the general population there would have been 239,016 more of them than were actually enumerated. This number, therefore, may be supposed either to have emigrated or to have adopted more specialised kinds of work.

Let us now examine the tables with the view of answering, so far as possible, the questions proposed in the earlier part of this article.

First.—The tables show that the decrease in the numbers of the aggregate agricultural population of the farmers, and of labourers (excluding shepherds), who together form the bulk of that population, was general throughout England and Wales, and that it was not confined to any particular part or parts of the country.

Secondly.—The tables show that the general decrease was not equally distributed throughout the country, but, on the contrary, that it varied to a very large extent in different counties. Thus, the decrease in the number of farmers varied from 2 per cent. in Cornwall to 22·4 per cent. in Oxfordshire and 22·3 per cent. in Surrey; and the decrease in the number of labourers varied from ·7 per cent. in the county of Rutland to 20·2 per cent. in that of Huntingdon, 24·6 per cent. in that of Radnor, and 25·2 per cent. in that of Brecon; and the decrease in the aggregate agricultural population varied from 1·7 per cent. in the county of Rutland to 18·8 per cent. in the county of Buckingham, and to 20 per cent. in that of Radnor.

Arranging the variations of decrease into the five divisions of under 5 per cent., from 5 per cent. to 10 per cent., from 10 to 15 per cent., from 15 per cent. to 20 per cent., and over 20 per cent., we have the following results for England and Wales respectively:—

ENGLAND.

Under 5 per cent.

Farmers.	Labourers.	Aggregate.
Cornwall.	Rutland.	Rutland.
Cumberland.	Worcester.	Worcester.
Westmorland.	York (N. R.).	
	„ (W. R.)	

From 5 per cent. to 10 per cent. (inclusive).

Chester.	Bedford.	Bedford.
Derby.	Chester.	Chester.
Dorset.	Cornwall.	Cornwall.
Hereford.	Derby.	Cumberland.
Lancaster.	Hereford.	Derby.
Northumberland.	Kent (extra-Metropolitan).	Hereford.
Salop.	Lancaster.	Hertford.
Somerset.	Lincoln.	Kent (extra-Metropolitan).
Stafford.	Middlesex (extra-Metropolitan).	Lancaster.
Wilts.	Norfolk.	Lincoln.
Worcester.	Nottingham.	Middlesex (extra-Metropolitan).
York (N. R.).	Warwick.	Monmouth.
	York (E. R.).	Norfolk.
		Nottingham.
		Salop.
		Suffolk.
		Warwick.
		Westmorland.
		York (E. R.).
		„ (N. R.).
		„ (W. R.).

From 10 per cent. to 15 per cent. (the latter inclusive).

Bedford.	Berks.	Berks.
Buckingham.	Cambridge.	Cambridge.
Cambridge.	Cumberland.	Devon
Devon.	Devon.	Dorset.
Durham.	Dorset.	Durham.
Gloucester.	Durham.	Essex.
Hants.	Essex.	Gloucester.
Kent (extra-Metropolitan).	Gloucester.	Hants.
Leicester.	Hertford.	Leicester.
Lincoln.	Leicester.	Northampton.
Monmouth.	Monmouth.	Northumberland.
Norfolk.	Northampton.	Oxford.
Nottingham.	Oxford.	Somerset.
Rutland.	Salop.	Stafford.
Suffolk.	Stafford.	Surrey.
Sussex.	Suffolk.	Sussex.
Warwick.	Surrey.	Wilts.
York (E. R.).	Sussex.	
„ (W. R.)	Westmorland.	

Population of England and Wales, &c., of 1871 and 1881. 103

From 15 per cent. to 20 per cent. (the latter inclusive).

Farmers.	Labourers.	Aggregate.
Berks.	Bucks.	Bucks.
Essex.	Hants.	Huntingdon.
Hertford.	Northumberland.	
Middlesex (extra-Metropolitan).	Somerset.	
	Wilts.	
<i>Above 20 per cent.</i>		
Huntingdon.	Huntingdon.	None.
Northampton.		
Oxford.		
Surrey.		

WALES.

Under 5 per cent.

Farmers.	Labourers.	Aggregate.
Anglesey.	Carnarvon.	Carnarvon.
Cardigan.		
Carnarvon.		

From 5 per cent. to 10 per cent. (inclusive).

Brecon.	None.	Anglesey.
Carmarthen.		Cardigan.
Flint.		
Glamorgan.		
Merioneth.		
Montgomery.		
Pembroke.		

From 10 per cent. to 15 per cent. (the latter inclusive).

Denbigh.	Anglesey.	Carmarthen.
Radnor.	Denbigh.	Denbigh.
	Glamorgan.	Flint.
	Montgomery.	Glamorgan.
		Merioneth.
		Montgomery.
		Pembroke.

From 15 per cent. to 20 per cent. (the latter inclusive).

None.	Cardigan.	Brecon.
	Flint.	Radnor.
	Merioneth.	
	Pembroke.	

Over 20 per cent.

None.	Brecon.	None.
	Carmarthen.	
	Radnor.	

Thirdly.—Comparing the decrease in the number of farmers with the decrease in the number of labourers. It appears from the extract from the ‘Census Report,’ already quoted, that the percentage of the decrease in the numbers of these two classes

throughout the whole of England and Wales was very nearly the same, being rather more than 10 per cent. (10·39) for the farmers, and “nearly 10 per cent.” for the labourers. Taking, however, the average decrease to be the same, namely 10 per cent. for both classes, we find that notwithstanding some very great differences in some English counties, the tables on the whole give a similar result for England, but a wholly different one for Wales. Thus:—

FARMERS.

	Above the Percentage for the whole country.	Under the Percentage for the whole country.
English Counties	27	{ 15 (including 1 of 10 per cent.)
Welsh	2	{ 10 (including 1 of 10 per cent.)
Total	29	25

LABOURERS.

	Above the Percentage for the whole country.	Under the Percentage for the whole country.
English Counties	25	17
Welsh	11	1
Total	36	18

That is to say, in 27 English counties the decrease in the number of farmers was more than the average, and in 25 the decrease in the number of labourers was more than the average. But in Wales only 2 counties had a decrease of more than the average in the numbers of their farmers, and 11 in the number of their labourers. Leaving Wales out of consideration, however, we find that 12 English counties show a decrease of from 5 per cent. to 10 per cent. in the number of their farmers, and 13 a similar percentage of decrease in the number of their labourers; and that 19 English counties show a decrease of from 10 per cent. to 15 per cent. in the numbers both of their farmers

and of their labourers. Further, we find that in each of the 9 following English counties, viz. Cheshire, Devonshire, Durham, Essex, Gloucestershire, Herefordshire, Huntingdonshire, Leicestershire, and Monmouthshire, the difference between the decrease in the numbers of farmers and the decrease in the number of labourers was less than 1 per cent.

In several English counties, however, we find a very marked difference between the percentages of decrease in the numbers of the farmers and of the labourers: thus, in the county of Rutland the labourers' decrease is only .7 per cent., but the farmers' 10.4 per cent.; in that of Hertford the labourers' decrease is 10.3 per cent., but the farmers' 19.8 per cent.; in the extra-metropolitan parts of the county of Middlesex the labourers' decrease is 5.3 per cent., but the farmers' 17.2 per cent.; in the extra-metropolitan parts of the county of Surrey the labourers' decrease is 11.6 per cent., but the farmers' 22.3 per cent.; in the county of Worcester the labourers' decrease is 3.1 per cent., but the farmers' 9.9 per cent.; and in the West Riding of Yorkshire the labourers' decrease is 2.9 per cent., but the farmers' 11.1 per cent. Conversely, in Cornwall the farmers' decrease is 2 per cent., but the labourers' 9 per cent.; in Cumberland the farmers' decrease is 4.6 per cent., but the labourers' 12.4 per cent.; in Derbyshire the farmers' decrease is 5.7 per cent., but the labourers' 10 per cent.; in Dorsetshire the farmers' decrease is 5.1 per cent., but the labourers' 12.7 per cent.; in Northumberland the farmers' decrease is 8.6 per cent., but the labourers' 15.8 per cent.; in Somerset the farmers' decrease is 8.4 per cent., but the labourers' 15.6 per cent.; in Westmorland the farmers' decrease is 3.9 per cent., but the labourers' 13.2 per cent.; and in Wilts the farmers' decrease is 7.4 per cent., but the labourers' 16.8 per cent.

Lastly.—Did the decrease affect the counties in which any special kind of farming was carried on more than the others? Or had any and what change been made in the farming of the counties most or least affected? Or did the counties in any particular geographical position suffer more or less than the others? Or, in short, was there any special circumstance to which we can attribute the greatest or the least decreases? It seems tolerably clear that the decrease in the number of farmers was greater in the 21 Eastern or corn-growing counties of England than in the 21 Western or grazing counties. And if we divide the counties into the three classes of "Corn-growing," "Pastoral," and "Mixed Pastoral and Corn-growing," as they are sometimes divided in the Official Agricultural Returns, we find that the decrease in the number of farmers was above the average in each of the five counties which are classified under the first of those divisions, that is to say, in Cam-

bridge, Essex, Hunts, Norfolk, and Suffolk; and in 14 out of the 16 counties which form the mixed pastoral and corn-growing division; but in 8 only of the remaining 21 counties which form the pastoral division. Again, if we take the 6 counties which, according to the Special Official Return made in 1881, had the largest quantities of unoccupied arable land, we find that the decrease in the number of farmers in all of those 6 (except Wilts) was considerably over the average; thus Essex, in which 5021 acres of arable land were returned as unoccupied, shows a decrease of 15·8 per cent. in the number of its farmers; Herts, which had 2876 unoccupied acres of arable land, shows a decrease of 19·8 per cent. in the number of its farmers; in Lincolnshire, which had 2575 unoccupied acres of arable land, the decrease shown is 14·9 per cent.; in Hunts, which had 2305 unoccupied acres of arable land, 20·4 per cent.; and in Cambridgeshire, which had 2234 unoccupied acres of arable land, 14·7 per cent.

The calculations which have been recently made by my friend Major Craigie as to the decrease in rent, also afford some confirmatory evidence that the decrease in the number of farmers in the Eastern and Midland counties was greater than in the rest, for the fewer the number of farmers the less would be the amount of rent received, unless the rents of the remaining had been raised, which we may assume was not the case. And Major Craigie's calculations show that in the Northern and North-Western counties the decrease in rent, according to the Inland Revenue Returns from 1877 to 1883, was $3\frac{1}{2}$ per cent.; in the Southern and South-Western counties 2 per cent., but in the Eastern 11 per cent., and in the Midland 11·2 per cent. From all these considerations we may, I think, fairly conclude that the decrease in the number of farmers is to be attributed, if not entirely, at all events to a very great extent, to the misfortunes which overtook those of them who were especially engaged in the cultivation of arable land during the latter part of the period from 1871 to 1881.

The decrease in the number of farm-labourers, however, does not follow the same geographical division in so marked a manner; for we find that the decrease in the number of the labourers is above the average in 12 only out of the 21 Eastern or corn-growing counties, but in 13 of the 21 Western or grazing counties; and sub-dividing the counties as before, into the three divisions of "corn-growing," "pastoral," and "mixed," we find a decrease of labourers above the average in 4 of the 5 counties comprised in the first division; in 9 of the 16 counties classified as "mixed corn-growing and pastoral;" and in no less than 12 of the 21 pastoral counties. Arable land farming does not seem therefore to have been the cause of the greatest de-

creases in the numbers of the labourers in the same degree as it appears to have been the cause of the greatest decreases in the numbers of the farmers; and we must seek for some other cause. Was the decrease greatest in those counties in which, during the period 1871 to 1881, the largest quantity of arable land had been converted into permanent pasture? It would occupy too much space, and I should weary the readers of the 'Journal' (if, indeed, my figures have not done so already), to compare the decrease in the number of farm-labourers with the increase in the acreage of permanent pasture in every English county; but as a test, I will make such comparison for the 6 counties which showed the maximum decrease, (over 15 per cent.,) and for the 4 counties which showed the minimum decrease (under 5 per cent.) in the number of farm-labourers: thus,—

	Percentage of Decrease of Farm Labourers.	PERMANENT PASTURE.			
		1871.	1881.	Increase in 1881.	Percentage of Increase.
		Acres.	Acres.	Acres.	
Hunts	20·2	57,147	62,399	5,252	9
Bucks	20·0	184,271	203,261	18,990	10·3
Wilts	16·8	302,974	355,925	52,951	17
Hants	16·7	154,982	199,103	44,121	22
Northumberland ..	15·8	336,207	418,574	82,367	24
Somerset	15·6	505,179	598,158	92,979	18
Rutland	0·7	39,863	44,675	4,812	12
York (W. R.)	2·9	674,832	766,095	91,263	13·5
Worcester	3·1	175,251	211,464	36,213	20
York (N. R.)	4·3	390,134	455,317	65,183	16·7

These figures hardly bear out the theory that the decrease in the number of farm-labourers in any individual county bears a corresponding ratio to the increase of permanent pasture in such county, for in the two counties—Hunts and Bucks—in which the percentage of the decrease of labourers was greater than in the rest of the counties mentioned above, the percentage of the increase of permanent pasture was less; and in Worcestershire, where the decrease of labourers was smaller than in any county in the above table except two, the increase in permanent pasture was greater than in any county except two.

Nor, again, does the decrease in the number of farm-labourers appear to have been the greatest in the mining or manufacturing counties, or in the counties which are situated nearest to such districts. For only one county (Northumberland) amongst the

six which showed the maximum decrease (over 15 per cent.) in the number of farm-labourers is a mining or manufacturing county, nor are any of the remaining five situated near to any mining or manufacturing district; and on the other hand, Worcestershire and the North and West Ridings of Yorkshire, if not mining or manufacturing counties themselves, are certainly situated near to mining or manufacturing districts, and yet in each of them the decrease in the number of farm-labourers was very small (under 5 per cent.).

A comparison between the ordinary money-wages paid to farm-labourers at the two periods we are considering, may perhaps help us to account for the variations in their number in different counties. Such a comparison cannot be very exact, because the only authentic returns from which, so far as I have been able to discover, the figures have to be taken, were not only made by different classes of persons or authorities, and in respect of different areas, but the several returns themselves are also by no means complete. The figures which are given in the table opposite for the wages which prevailed in or about 1870-71, are for the most part taken from a Parliamentary paper which consisted of Returns from several Poor-law Unions, filled up by Boards of Guardians. A very large number of those bodies, however, apparently declined to fill up the returns, and others seem to have filled them up in a very careless manner, so that the returns cannot be regarded as accurate. Perhaps it was for these reasons that they were discontinued, for I do not find that they lasted longer than from 1869, the year of the original order of the House of Commons directing this series of them to be made,* until 1872, after which they ceased altogether. It appears to have been intended that these returns should be made quarterly; but I could find no return for the quarter which ended Lady Day 1871 (which would have been the one I should have selected as being the nearest to the time of year when the 1871 Census was taken), but only the returns for the harvest and later periods of that year, and I therefore took the returns for the spring quarter of the previous year, 1870. But as there were no returns for that quarter for Bucks, Cambs, Middlesex, Oxon, Salop, and the East Riding of Yorkshire, I have supplemented my table with figures for those counties (except Middlesex and the East Riding, for which I could find no returns at all) taken either from similar returns of other dates near that quarter, or from the Reports of the Commissioners on the employment of children, young persons, and women in Agriculture, which latter refer to a rather earlier period, viz. 1867-68. The 1880-81 figures are taken from the

* Similar returns appear to have been made in 1860-61.

RATE OF MONEY WAGES OF ORDINARY AGRICULTURAL LABOURERS in the YEARS 1870-71 and 1880-81.

NAME OF COUNTY.	1870-71. Per Week.	1880-81. Per Week.
Beds	10/ to 11/	12/ to 13/
Berks	10/	11/ to 13/
Bucks*	11/ to 13/	13/ to 14/ Winter 14/ to 15/ Summer
Cambs†	10/ to 12/	12/ to 13/
Chester	12/ to 15/	(No general return)
Cornwall	11/	14/ to 15/
Cumberland	15/ or †9/	18/
Derby	14/	15/ to 18/
Devon	8/6 to 12/	11/ to 15/
Dorset	8/6 to 11/6	10/ to 12/
Durham	15/ to 17/	17/6 to 18/
Essex	10/ to 12/	12/ to 13/
Gloster	9/6 to 12/	12/ to 15/
Hants	10/ to 11/	11/ to 13/
Hereford	9/ to 10/	12/ to 14/
Herts	10/9 to 11/3	12/ to 15/
Hunts	11/	12/
Kent (Extra-Metropn.)	13/ to 15/	15/ to 18/
Lancaster	15/ or †7/	17/ to 18/
Leicester	12/ to 14/	11/ to 12/ Ordinary Districts 14/ to 15/ Ironstone Districts
Lincoln	13/6	13/6 to 15/
Middlesex	(No Return)	15/ to 16/
Monmouth	11/ to 16/6	12/
Norfolk	10/	12/ to 13/
Northants	11/ to 12/	13/ to 14/
Northumberland	15/ to 18/	15/ to 18/
Notts	12/ to 14/	13/ to 15/ Ordinary 18/ to 20/ Colliery District
Oxon*	10/ to 13/	11/ to 15/6
Rutland	12/	(No Return)
Salop	10/ to 12/	12/ to 14/
Somerset	10/ to 11/	11/ to 15/
Stafford	13/	12/ to 15/
Suffolk	10/ to 12/	12/ to 13/
Surrey (Extra-Metropn.)	13/ to 14/	14/ to 16/
Sussex	11/ to 13/	12/ to 15/
Warwick	11/ to 12/	12/ to 16/
Westmorland	14/ to 17/	18/
Wilts	9/6 to 11/	11/ to 13/
Worcester	10/ to 12/	13/6
York (E. R.)	(No Return)	15/
" (N. R.)	12/ to 15/	16/ to 17/
" (W. R.)	13/6 to 17/	15/ to 18/

* Extracted from the 'Report of the Commissioners on the Employment of Women and Children in Agriculture, 1867-68.'

† For quarter ended Michaelmas 1869 (harvest money not included).

‡ The latter with board and lodging.

Reports of the Assistant Commissioners on the Duke of Richmond's Commission, but, as will be noticed, there are no returns for Cheshire or Rutland. So far as possible, I have taken the ordinary money-wages only, and have not added anything for harvest money, or for the value of a cottage or garden, or allotment, or for beer or other allowances, which, or some of which, must be added to the ordinary money-wages if we wish to arrive at the actual payment that the ordinary agricultural labourer in England receives for the work that he does.

The table shows that the agricultural labourers in every or nearly every county in England (except in those for which, as I have above pointed out, no comparison can be made—and there is no reason to doubt that the increase took place in them as well as in the rest) received higher money-wages in 1881 than they did in 1871. The increase, however, seems to have been greater in some counties than in others; and in some of those in which it was the least, the decrease in the number of the labourers was very high, if not the highest. Thus there was only a shilling a week rise in the wages paid in Huntingdonshire, where the decrease in the number of labourers was the most; and, on the other hand, there was a rise of 2*s.* to 4*s.* a week in the wages in the North Riding, but only a small (under 5 per cent.) decrease in the number of labourers in that county.

IN WALES the difference between the percentages of the decrease in the number of farmers and in the number of labourers is very considerable. Thus, in 2 only out of the 12 counties of the Principality is the decrease in the number of the farmers more than 10 per cent.; but the labourers decreased by that percentage in no less than 11 out of the 12 counties, and in 3 out of those 11 counties their decrease was over 20 per cent. In two counties only was the percentage of the decrease in the number of farmers and labourers anything like equal, viz. in Carnarvonshire, where the farmers decreased in number 4·8 per cent. and the labourers 4·9 per cent.; and in Glamorganshire, where the farmers decreased in number 10 per cent. and the labourers 11·2 per cent. In most of the Welsh counties the difference in the percentages of decrease was very wide. Thus in Anglesey the farmers decreased in number 3·6 per cent., but the labourers 11·6 per cent.; in the county of Brecon the farmers decreased in number 9·7 per cent., but the labourers 25·2 per cent.; in the county of Cardigan the farmers decreased in number 2·7 per cent., but the labourers 17·8 per cent.; and in Radnorshire the farmers decreased in number 14·5 per cent., but the labourers 24·6 per cent. Any comparison between the farmers and farm-labourers in Wales, however, is of very little value, for, as my late colleague (Mr. Doyle) observes in his Report to the Royal Commission on Agriculture, "the

well-marked distinction between the English farmer and the labourer is in the greater portion of the Principality hardly distinguishable;" and it may very well be that the same class of persons returned themselves as farmers in one district and as farm-labourers in another. Nor need we inquire as to the causes of the decrease in any particular counties, for emigration and migration are the characteristics of the Welsh agricultural classes, no matter in what part of Wales they may live. As Mr. Doyle says, "the younger members of this class never hesitate to seek employment away from home; they emigrate and migrate freely and without hesitation. In proportion to the population, the number of Welsh emigrants to the United States and Canada is considerable; while in such towns as Liverpool and Bristol the Welsh community is an appreciable proportion of the whole. The mining population of Glamorganshire and of the works in the hill district of Breconshire is largely recruited from the rural districts of Cardiganshire and Carmarthenshire, as in North Wales similar industries are supplied with labour from Flintshire, Denbighshire and Carnarvonshire." The proximity of these industries no doubt accounts for the extremely high percentage of decrease which the Welsh counties show in the number of their labourers.

In Wales, as in England, the rate of money wages paid to agricultural labourers appears to have increased during the decade 1870-71 to 1880-81. Mr. Doyle, in his Supplemental Report on the Welsh Labourers, which is dated in January, 1882, says: "The practice of boarding and lodging the labourer is more general in Wales than in England, and in such cases the money wages would average 9s. a week. The average wages of labourers who maintain themselves may be taken at 14s. per week, with continuous employment. In the immediate neighbourhood of quarries and iron works wages run up from 15s. to 18s., and in one union, Festiniog, to 20s. per week." And if we refer to the Parliamentary Returns of 1870, from which I have extracted the rates of wages for most of the English counties, we find wages as low as 10s. a week and as high as 15s.; but the average is about 12s. a week as compared with Mr. Doyle's 14s. per week; and in the case of labourers who were boarded and lodged by their masters, 8s. a week as against Mr. Doyle's 9s. a week.

As regards the classes of "Farm Bailiffs," "Shepherds," and "Machine Proprietors and Attendants," mentioned in the tables. It will be noticed that there was an increase in the number of farm-bailiffs in every English county except three, viz. the counties of Cumberland, where there was a decrease of 18 per cent.; Lincoln, where there was a decrease of 4·2 per cent.;

and Northumberland, where there was a decrease of 2·4 per cent. In five of the Welsh counties, viz. Brecon, Cardigan, Merioneth, Montgomery, and Radnor, the number of farm-bailiffs decreased, and in the remaining seven the number increased. As pointed out in the General Report of the Census, the increase in the number of farm-bailiffs tends to show that an increased acreage of land was being farmed by the owners; which was the case, as we all know.

The number of shepherds decreased in most of the English counties, but increased in the 15 following:—Cumberland, Derby, Durham, Hants, Hereford, Kent, Lincoln, Northumberland, Salop, Stafford, Suffolk, Sussex, Westmorland, York (E. R.), and York (W. R.). In 4 of these counties the increase in the number of shepherds was very large, namely, in Westmorland 50·9 per cent., in the East Riding 42 per cent., in Cumberland 25·1 per cent., and in Salop 23·5 per cent.; and in 5 of them it was very small, namely, in Staffordshire ·7 per cent., in Sussex 1·7 per cent., in Lincolnshire 2·9 per cent., in Derbyshire 3·1 per cent., and in Kent 3·3 per cent. As regards Wales, the number of shepherds remained practically unchanged in the counties of Anglesey, Brecon and Pembroke; it decreased in those of Carmarthen, Flint, and Glamorgan; and it increased in the remaining six counties.

The number of machine proprietors and attendants increased in every county in England, and in most of them by very large percentages, except in Cumberland, where their number went down from 11 in 1871, to 4 in 1881; and in Staffordshire, where their number fell from 71 at the former period, to 68 at the latter. The number of persons who were returned in the several Welsh counties under this head was very small, the highest number being 19, which was returned from each of the counties of Carnarvon and Montgomery in 1881, and 20, which was returned for the latter county in 1871. The total number of persons who were returned under this head for the whole Principality in 1881, was, however, rather more than double the number which was so returned in 1871; the actual figures being for 1881, 89, and for 1871, 42. The very large and general increase in this class throughout the whole country accounts, no doubt, to a certain extent, for the decrease in the number of ordinary farm-labourers, and shows to how great an extent farmers availed themselves of machinery.

The numbers in the remaining division of the tables, viz. "Miscellaneous," do not appear to call for any special comment, and from the explanation which I have already given in regard to that division, it will be clear that no fair comparison can be drawn between its numbers for 1871 and 1881.

APPENDIX.

TABLES showing the difference and the percentage of difference between the numbers of the various classes of the Agricultural Population of England and Wales, as given in the Census Returns for 1871 and 1881, arranged according to Registration Counties, in alphabetical order:—

ENGLAND.

AGRICULTURAL OCCUPATIONS.	1871.			1881.			Incr. (+) or Decr. (—) of 1881 over or under 1871.	Percentage of Increase or Decrease.
	Males.	Fem.	Total of both Sexes.	Males.	Fem.	Total of both Sexes.		
BEDFORDSHIRE.								
Farmers & Graziers	1,404	123	1,527	1,209	92	1,301	— 226	— 14·8
Farm Bailiffs	162	..	162	177	..	177	+ 15	+ 9·2
Labourers	16,337	60	16,397	14,749	79	14,828	—1569	— 9·5
Shepherds	410	..	410	318	..	318	— 92	— 22·4
Machine Proprietors and Attendants .. }	14	..	14	67	1	68	+ 54	+386·6
Miscellaneous	19	..	19	17	..	17	— 2	..
Total for Beds ..	18,346	183	18,529	16,537	172	16,709	—1820	— 9·8
BERKSHIRE.								
Farmers & Graziers	1,838	125	1,963	1,531	90	1,621	— 342	— 17·4
Farm Bailiffs	382	..	382	417	..	417	+ 35	+ 9·1
Labourers	21,102	1975	23,077	18,638	1162	19,800	—3277	— 14·2
Shepherds	1,053	..	1,053	980	..	980	— 73	— 6·9
Machine Proprietors and Attendants .. }	60	..	60	151	2	153	+ 93	+155·
Miscellaneous	36	4	40	62	1	63	+ 23	..
Total for Berks	24,471	2104	26,575	21,779	1255	23,034	—3541	— 13·3
BUCKS.								
Farmers & Graziers	1,889	133	2,022	1,605	112	1,717	— 305	— 15
Farm Bailiffs	191	..	191	222	..	222	+ 31	+ 14 almost
Labourers	16,563	259	16,822	13,277	191	13,468	—3554	— 20 almost
Shepherds	453	..	453	394	..	394	— 59	— 13
Machine Proprietors and Attendants .. }	20	..	20	46	..	46	+ 26	+130
Miscellaneous	6	..	6	36	3	39	+ 33	..
Total for Bucks	19,132	392	19,514	15,580	306	15,886	—3628	— 18·5
CAMBRIDGESHIRE.								
Farmers & Graziers	3,645	248	3,893	3,143	174	3,317	— 576	— 14·7
Farm Bailiffs	373	..	373	391	..	391	+ 18	+ 4·8
Labourers	23,032	2187	25,219	20,994	1425	22,419	—2800	— 11·1
Shepherds	645	..	645	581	..	581	— 64	— 10 almost
Machine Proprietors and Attendants .. }	98	..	98	150	4	154	+ 56	+ 57·1
Miscellaneous	16	..	16	55	1	56	+ 40	..
Total for Cambs.	27,809	2435	30,244	25,314	1604	26,918	—3226	— 11 almost

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REGISTRATION COUNTIES IN ENGLAND—continued.

AGRICULTURAL OCCUPATIONS.	1871.			1881.			Incr. (+) or Decr. (-) of 1881 over or under 1871.	Percentage of Increase or Decrease.
	Males.	Fem.	Total of both Sexes.	Males.	Fem.	Total of both Sexes.		
CHESHIRE.								
Farmers & Graziers	6,928	950	7,878	6,287	854	7,141	- 737	- 9.3
Farm Bailiffs	202	..	202	272	..	272	+ 70	+ 34.6
Labourers	18,146	1207	19,353	16,558	887	17,445	-1908	- 9.8
Shepherds	91	..	91	74	..	74	- 17	- 18.6
Machine Proprietors and Attendants .. }	10	..	10	22	..	22	+ 12	+120
Miscellaneous	48	1	49	59	..	59	+ 10	..
Total for Cheshire	25,425	2158	27,583	23,272	1741	25,013	-2570	- 9.3
CORNWALL.								
Farmers & Graziers	8,017	549	8,566	7,722	665	8,387	- 179	- 2
Farm Bailiffs	124	..	124	193	..	193	+ 69	+ 55.6
Labourers	16,516	1820	18,336	15,393	1291	16,684	-1652	- 9
Shepherds	82	..	82	73	..	73	- 9	- 11 almost
Machine Proprietors and Attendants .. }	10	..	10	22	..	22	+ 12	+120
Miscellaneous	20	..	20	28	..	28	+ 8	..
Total for Cornwall	24,769	2369	27,138	23,431	1956	25,387	-1751	- 6.4
CUMBERLAND.								
Farmers & Graziers	4,795	615	5,410	4,654	502	5,156	- 254	- 4.6
Farm Bailiffs	183	..	183	150	..	150	- 33	- 18
Labourers	9,414	1598	11,012	8,579	1059	9,638	-1374	- 12.4
Shepherds	167	..	167	209	..	209	+ 42	+ 25.1
Machine Proprietors and Attendants .. }	11	..	11	4	..	4	- 7	- 63.6
Miscellaneous	49	..	49	40	..	40	- 9	..
Total for Cumb.	14,619	2213	16,832	13,636	1561	15,197	-1635	- 9.7
DERBYSHIRE.								
Farmers & Graziers	5,396	782	6,178	5,211	609	5,820	- 358	- 5.7
Farm Bailiffs	134	..	134	161	..	161	+ 27	+ 20
Labourers	8,304	596	8,900	7,672	341	8,013	- 887	- 10 almost
Shepherds	63	..	63	65	..	65	+ 2	+ 3.1
Machine Proprietors and Attendants .. }	8	..	8	14	..	14	+ 6	+ 75
Miscellaneous	15	..	15	14	..	14	- 1	..
Total for Derby .	13,920	1378	15,298	13,137	950	14,087	-1211	- 7.9

Population of England and Wales, &c., of 1871 and 1881. 115

REGISTRATION COUNTIES IN ENGLAND—continued.

AGRICULTURAL OCCUPATIONS.	1871.			1881.			Incr. (+) or Decr. (-) of 1881 over or under 1871.	Percentage of Increase or Decrease.
	Males.	Fem.	Total of both Sexes.	Males.	Fem.	Total of both Sexes.		
DEVONSHIRE.								
Farmers & Graziers	10,313	608	10,921	9,229	525	9,754	-1167	- 10·6
Farm Bailiffs	230	..	230	402	..	402	+ 172	+ 75 almost
Labourers	33,662	1471	35,133	29,282	1196	30,478	-4655	- 10·4
Shepherds	316	..	316	310	..	310	- 6	- 2 nearly
Machine Proprietors and Attendants .. }	14	..	14	58	..	58	+ 44	+314·2
Miscellaneous ..	107	1	108	97	..	97	- 11	..
Total for Devon	44,642	2080	46,722	39,378	1721	41,099	-5623	- 11·6
DORSETSHIRE.								
Farmers & Graziers	2,295	173	2,468	2,163	177	2,340	- 128	- 5·1
Farm Bailiffs	216	..	216	266	..	266	+ 50	+ 23·1
Labourers	15,964	1245	17,209	14,222	787	15,009	-2200	- 12·7
Shepherds	792	..	792	759	..	759	- 33	- 4·1
Machine Proprietors and Attendants .. }	21	..	21	73	..	73	+ 52	+248
Miscellaneous ..	32	2	34	33	..	33	- 1	..
Total for Dorset.	19,320	1420	20,740	17,516	964	18,480	-2260	- 10·6
DURHAM.								
Farmers & Graziers	3,892	382	4,274	3,347	363	3,710	- 564	- 13·1
Farm Bailiffs	246	..	246	304	..	304	+ 58	+ 25·3
Labourers	7,376	1579	8,955	6,674	1183	7,857	-1098	- 12·2
Shepherds	105	..	105	117	..	117	+ 12	+ 11·4
Machine Proprietors and Attendants .. }	25	..	25	32	..	32	+ 7	+ 28
Miscellaneous ..	103	3	106	157	..	157	+ 51	..
Total for Durham	11,747	1964	13,711	10,631	1546	12,177	-1534	- 11·1
ESSEX.								
Farmers & Graziers	3,614	311	3,925	3,083	220	3,303	- 622	- 15·8
Farm Bailiffs	852	..	852	1,012	..	1,012	+ 160	+ 18·7
Labourers	44,130	1020	45,150	37,742	638	38,380	-6770	- 15 almost
Shepherds	463	..	463	436	..	436	- 27	- 5·8
Machine Proprietors and Attendants .. }	95	..	95	210	2	212	+ 117	+123
Miscellaneous ..	25	1	26	47	1	48	+ 22	..
Total for Essex	49,179	1332	50,511	42,530	861	43,391	-7120	- 14

REGISTRATION COUNTIES IN ENGLAND—continued.

AGRICULTURAL OCCUPATIONS.	1871.			1881.			Incr. (+) or Decr. (-) of 1881 over or under 1871.	Percentage of Increase or Decrease.
	Males.	Fem.	Total of both Sexes.	Males.	Fem.	Total of both Sexes.		
GLOUCESTERSHIRE.								
Farmers & Graziers	3,751	381	4,132	3,279	328	3,607	- 525	- 12·7
Farm Bailiffs	339	..	339	368	..	368	+ 29	+ 8·5
Labourers	20,586	2007	22,593	18,650	1150	19,800	- 2793	- 12·3
Shepherds	714	..	714	688	..	688	- 26	- 3·6
Machine Proprietors and Attendants .. }	40	.. ..	40	87	..	87	+ 47	+117·5
Miscellaneous	124	..	124	146	..	146	+ 22	..
Total for Gloucester.	25,554	2388	27,942	23,218	1478	24,696	- 3246	- 11·2
HAMPSHIRE.								
Farmers & Graziers	3,302	247	3,549	2,961	203	3,164	- 385	- 10·8
Farm Bailiffs	496	..	496	597	..	597	+ 101	+ 20·3
Labourers	29,780	836	30,616	24,985	492	25,477	- 5139	- 16·7
Shepherds	1,396	..	1,396	1,481	..	1,481	+ 85	+ 6
Machine Proprietors and Attendants .. }	71	..	71	265	1	266	+ 195	+274·6
Miscellaneous	34	..	34	80	6	86	+ 52	..
Total for Hants	35,079	1083	36,162	30,369	702	31,071	- 5091	- 14
HEREFORDSHIRE.								
Farmers & Graziers	3,122	374	3,496	2,901	327	3,228	- 268	- 7·6
Farm Bailiffs	271	..	271	304	..	304	+ 33	+ 12·1
Labourers	11,824	733	12,557	11,123	453	11,576	- 981	- 7·8
Shepherds	215	.. ..	215	229	..	229	+ 14	+ 6·5
Machine Proprietors and Attendants .. }	22	.. ..	22	44	.. ..	44	+ 22	+100
Miscellaneous	55	..	55	73	..	73	+ 18	..
Total for Hereford.	15,509	1107	16,616	14,674	780	15,454	- 1162	- 7 almost
HERTFORDSHIRE.								
Farmers & Graziers	1,621	129	1,750	1,308	95	1,403	- 347	- 19·8
Farm Bailiffs	354	..	354	391	..	391	+ 37	+ 10·4
Labourers	18,821	203	19,024	16,877	178	17,055	- 1969	- 10·3
Shepherds	585	.. ..	585	525	..	525	- 60	- 10·2
Machine Proprietors and Attendants .. }	34	..	34	102	.. ..	102	+ 68	+200
Miscellaneous	16	..	16	112	9	121	+ 105	..
Total for Herts ..	21,431	332	21,763	19,315	282	19,597	- 2166	- 9·9

REGISTRATION COUNTIES IN ENGLAND—continued.

AGRICULTURAL OCCUPATIONS.	1871.			1881.			Increase (+) or Decrease (—) of 1881 over or under 1871.	Percentage of Increase or Decrease.
	Males.	Fem.	Total of both Sexes.	Males.	Fem.	Total of both Sexes.		
HUNTINGDONSHIRE.								
Farmers & Graziers	1,022	68	1,090	819	48	867	— 223	— 20·4
Farm Bailiffs	67	..	67	127	..	127	+ 60	+ 89·5
Labourers	8,419	440	8,859	6,782	286	7,068	— 1791	— 20·2
Shepherds	183	..	183	166	..	166	— 17	— 9·3
Machine Proprietors and Attendants }	14	..	14	53	1	54	+ 40	+ 285·6
Miscellaneous ..	6	..	6	12	2	14	+ 8	..
Total for Hunts.	9,711	508	10,219	7,959	337	8,296	— 1923	— 18·8
KENT. (Extra-Metropn.)								
Farmers & Graziers	4,655	364	5,019	4,068	276	4,344	— 675	— 13·4
Farm Bailiffs	1,273	..	1,273	1,329	..	1,329	+ 56	+ 4·3
Labourers	41,910	915	42,825	38,901	1147	40,048	— 2777	— 6·4
Shepherds	922	..	922	953	..	953	+ 31	+ 3·3
Machine Proprietors and Attendants .. }	94	..	94	193	..	193	+ 99	+ 103
Miscellaneous ..	41	2	43	80	..	80	+ 37	..
Total for Kent.. (Extra Metropn.)	48,895	1281	50,176	45,524	1423	46,947	— 3229	— 6·4
LANCASHIRE.								
Farmers & Graziers	16,003	2048	18,051	14,823	1625	16,448	— 1603	— 8·8
Farm Bailiffs	410	..	410	590	..	590	+ 180	+ 43·9
Labourers	29,232	2189	31,421	26,286	2009	28,295	— 3126	— 9·9
Shepherds	124	..	124	115	..	115	— 9	— 7·2
Machine Proprietors and Attendants }	12	..	12	30	..	30	+ 18	+ 150
Miscellaneous ..	62	2	64	93	3	96	+ 32	..
Total for Lancas.	45,843	4239	50,082	41,937	3637	45,574	— 4508	— 9
LEICESTERSHIRE.								
Farmers & Graziers	3,401	356	3,757	2,994	289	3,283	— 474	— 12·6
Farm Bailiffs	174	..	174	234	..	234	+ 60	+ 34·5
Labourers	14,363	405	14,768	12,758	207	12,965	— 1803	— 12·2
Shepherds	549	..	549	513	..	513	— 36	— 6·5
Machine Proprietors and Attendants .. }	42	..	42	85	..	85	+ 43	+ 102·3
Miscellaneous ..	36	..	36	42	..	42	+ 6	..
Total for Leicester.	18,565	761	19,326	16,626	496	17,122	— 2204	— 11·3

REGISTRATION COUNTIES IN ENGLAND—continued.

AGRICULTURAL OCCUPATIONS.	1871.			1881.			Increase (+) or Decrease (—) of 1881 over or under 1871.	Percentage of Increase or Decrease.
	Males.	Fem.	Total of both Sexes.	Males.	Fem.	Total of both Sexes.		
LINCOLNSHIRE.								
Farmers & Graziers	10,871	917	11,788	9,470	578	10,048	— 1740	— 14·9
Farm Bailiffs	1,215	..	1,215	1,161	..	1,161	— 54	— 4·2
Labourers	45,774	1855	47,129	42,057	990	43,047	— 4082	— 9
Shepherds	1,547	..	1,547	1,593	..	1,593	+ 46	+ 2·9
Machine Proprietors and Attendants .. }	303	..	303	547	6	553	+ 250	+ 82·1
Miscellaneous ..	100	4	104	82	..	82	— 22	..
Total for Lincoln	59,810	2276	62,086	54,910	1574	56,484	— 5602	— 9
MIDDLESEX. (Extra-Metropn.)								
Farmers & Graziers	782	62	844	654	44	698	— 146	— 17·2
Farm Bailiffs	171	..	171	183	..	183	+ 12	+ 7
Labourers	6,517	457	6,974	6,367	232	6,599	— 375	— 5·3
Shepherds	103	..	103	60	..	60	— 43	— 41·7
Machine Proprietors and Attendants .. }	4	..	4	20	..	20	+ 16	+ 400
Miscellaneous ..	12	..	12	23	1	24	+ 12	..
Total for Middlesex (Extra Metropn.) }	7,589	519	8,108	7,307	277	7,584	— 524	— 6·4
MONMOUTHSHIRE.								
Farmers & Graziers	2,492	316	2,808	2,198	313	2,511	— 297	— 10·5
Farm Bailiffs	187	..	187	232	..	232	+ 45	+ 24
Labourers	5,284	297	5,581	4,784	217	5,001	— 580	— 10·3
Shepherds	135	..	135	111	..	111	— 24	— 17·7
Machine Proprietors and Attendants .. }	20	..	20	15	..	15	+ 5	+ 15
Miscellaneous ..	26	..	26	29	..	29	+ 3	..
Total for Monmouth	8,144	613	8,757	7,369	530	7,899	— 858	— 9·8
NORFOLK.								
Farmers & Graziers	6,029	444	6,473	5,418	359	5,777	— 696	— 10·7
Farm Bailiffs	892	..	892	1,025	..	1,025	+ 133	+ 14·9
Labourers	41,620	3137	44,757	39,331	1736	41,067	— 3690	— 8·2
Shepherds	1,186	..	1,186	1,122	..	1,122	— 64	— 5·3
Machine Proprietors and Attendants .. }	116	..	116	254	2	256	+ 140	+ 120·7
Miscellaneous ..	39	..	39	120	..	120	+ 81	..
Total for Norfolk	49,882	3581	53,463	47,270	2097	49,367	— 4096	— 7·6

REGISTRATION COUNTIES IN ENGLAND—continued.

AGRICULTURAL OCCUPATIONS.	1871.			1881.			Incr. (+) or Decr. (-) of 1881 over or under 1871.	Percentage of Increase or Decrease.
	Males.	Fem.	Total of both Sexes.	Males.	Fem.	Total of both Sexes.		
NORTHAMPTONSHIRE.								
Farmers & Graziers	2,763	207	2,970	2,170	158	2,328	- 642	- 21·6
Farm Bailiffs	224	..	224	286	..	286	+ 62	+ 27·6
Labourers	22,259	812	22,571	19,269	236	19,505	- 3066	- 13·5
Shepherds	925	..	925	834	..	834	- 91	- 9·8
Machine Proprietors and Attendants }	58	..	58	103	1	104	+ 46	+ 79·3
Miscellaneous ..	26	1	27	26	..	26	- 1	..
Total for Northamp.	26,255	520	26,775	22,688	395	23,083	- 3692	- 13·7
NORTHUMBERLAND.								
Farmers & Graziers	2,956	380	3,336	2,756	292	3,048	- 288	- 8·6
Farm Bailiffs	372	..	372	363	..	363	- 9	- 2·4
Labourers	10,014	3894	13,908	8,849	3361	11,710	- 2198	- 15·8
Shepherds	1,173	..	1,173	1,274	..	1,274	+ 101	+ 8·6
Machine Proprietors and Attendants }	49	..	49	51	..	51	+ 2	+ 4
Miscellaneous ..	195	..	195	161	..	161	- 34	..
Total for Northum.	14,759	4274	19,033	12,954	3653	16,607	- 2426	- 12·7
NOTTINGHAMSHIRE.								
Farmers & Graziers	3,812	480	4,292	3,413	293	3,703	- 586	- 13·6
Farm Bailiffs	378	..	378	426	..	426	+ 48	+ 12·6
Labourers	14,659	288	14,947	13,812	293	13,605	- 1342	- 8·9
Shepherds	491	..	491	298	..	298	- 193	- 37·7
Machine Proprietors and Attendants }	62	..	62	125	..	125	+ 63	+ 101·6
Miscellaneous ..	47	1	48	65	1	66	+ 18	..
Total for Notts.	19,449	769	20,218	17,639	587	18,226	- 1992	- 9·8
OXFORDSHIRE.								
Farmers & Graziers	2,121	177	2,298	1,652	130	1,782	- 516	- 22·4nearly
Farm Bailiffs	221	..	221	291	..	291	+ 70	+ 31·6
Labourers	19,305	1351	20,656	17,084	687	17,751	- 2905	- 14
Shepherds	875	..	875	823	..	823	- 52	- 5·9
Machine Proprietors and Attendants }	43	..	43	83	..	83	+ 40	+ 100
Miscellaneous ..	28	..	28	32	2	34	+ 6	..
Total for Oxford.	22,593	1528	24,121	19,965	799	20,764	- 3357	- 13·9

REGISTRATION COUNTIES IN ENGLAND—continued.

AGRICULTURAL OCCUPATION.	1871.			1881.			Increase (+) or Decrease (—) of 1881 over or under 1871.	Percentage of Increase or Decrease.
	Males.	Fem.	Total of both Sexes.	Males.	Fem.	Total of both Sexes.		
RUTLANDSHIRE.								
Farmers & Graziers	531	65	596	492	42	534	— 62	— 10.4
Farm Bailiffs	22	..	22	32	..	32	+ 10	+ 45.4
Labourers	2,512	40	2,552	2,501	31	2,532	— 20	— 0.7
Shepherds	166	..	166	160	..	160	— 6	— 3.7
Machine Proprietors and Attendants }	4	..	4	18	.1	19	+ 15	+ 375
Miscellaneous ..	7	..	7	12	..	12	+ 5	..
Total for Rutland	3,242	105	3,347	3,215	74	3,289	— 58	— 1.7
SHROPSHIRE.								
Farmers & Graziers	5,315	787	6,102	4,940	626	5,566	— 536	— 8.7
Farm Bailiffs	449	..	449	458	..	458	+ 9	+ 2
Labourers	20,051	1114	21,165	18,159	689	18,848	— 2317	— 10.9
Shepherds	263	..	263	325	..	325	+ 62	+ 23.5
Machine Proprietors and Attendants }	56	..	56	87	.1	88	+ 32	+ 57.1
Miscellaneous ..	103	..	103	195	..	195	+ 92	..
Total for Salop	26,237	1901	28,138	24,164	1316	25,480	— 2658	— 9.4
SOMERSETSHIRE.								
Farmers & Graziers	7,651	626	8,277	7,078	502	7,580	— 697	— 8.4
Farm Bailiffs	277	..	277	387	..	387	+ 110	+ 39.7
Labourers	29,756	3017	32,773	26,479	1662	28,141	— 4632	— 15.6
Shepherds	589	..	589	544	..	544	— 45	— 7.6
Machine Proprietors and Attendants }	21	..	21	82	.2	84	+ 63	+ 300
Miscellaneous ..	111	2	113	188	35	223	+ 110	..
Total for Somerset	38,405	3645	42,050	34,758	2201	36,959	— 5091	— 12.1
STAFFORDSHIRE.								
Farmers & Graziers	5,911	787	6,698	5,656	617	6,273	— 425	— 6.3
Farm Bailiffs	352	..	352	393	..	393	+ 41	+ 11.3
Labourers	18,143	981	19,124	15,666	678	16,344	— 2780	— 13.4
Shepherds	254	..	254	256	..	256	+ 2	+ 0.7
Machine Proprietors and Attendants }	71	..	71	67	.1	68	— 3	— 4.2
Miscellaneous ..	53	..	53	56	.2	58	+ 5	..
Total for Stafford	24,784	1768	26,552	22,094	1298	23,392	— 3160	— 11.9

Population of England and Wales, &c., of 1871 and 1881. 121

REGISTRATION COUNTIES IN ENGLAND—continued.

AGRICULTURAL OCCUPATION.	1871.			1881.			Incr. (+) or Decr. (-) of 1881 over or under 1871.	Percentage of Increase or Decrease.
	Males.	Fem.	Total of both Sexes.	Males.	Fem.	Total of both Sexes.		
SUFFOLK.								
Farmers & Graziers	4,654	423	5,077	4,026	325	4,351	- 726	- 14.3
Farm Bailiffs	746	..	746	934	..	934	+ 188	+ 25.2
Labourers	39,089	1252	40,341	35,515	710	36,225	-4116	- 10.2
Shepherds	733	..	733	769	..	769	+ 36	+ 5 nearly
Machine Proprietors and Attendants }	92	..	92	224	.1	225	+ 133	+144.5
Miscellaneous	42	2	44	60	.1	61	+ 17	..
Total for Suffolk	45,356	1677	47,033	41,528	1087	42,565	-4468	- 9.4
SURREY. (Extra-Metropn.)								
Farmers & Graziers	1638	100	1,738	1,275	75	1,350	- 388	- 22.3
Farm Bailiffs	354	..	354	485	..	485	+ 131	+ 37
Labourers	15,359	552	15,911	13,646	412	14,058	-1853	- 11.6
Shepherds	336	..	336	290	..	290	- 46	- 13.6
Machine Proprietors and Attendants }	41	..	41	41	..	41	{ No change }	..
Miscellaneous	19	..	19	64	1	65	+ 46	..
Total for Surrey (Extra-Metropn.) }	17,747	652	18,399	15,801	488	16,289	-2110	- 11.5
SUSSEX.								
Farmers & Graziers	3,881	275	4,156	3,388	201	3,589	- 567	- 13.6
Farm Bailiffs	685	..	685	796	..	796	+ 111	+ 16.1
Labourers	32,872	309	32,681	28,654	272	28,926	-3755	- 11.4
Shepherds	947	..	947	964	..	964	+ 17	+ 1.7
Machine Proprietors and Attendants }	95	..	95	157	3	160	+ 65	+ 68.4
Miscellaneous	40	4	44	49	1	50	+ 6	..
Total for Sussex	38,020	588	38,608	34,008	477	34,485	-4123	- 10.6
WARWICKSHIRE.								
Farmers & Graziers	3,374	390	3,764	3,087	246	3,333	- 431	- 11.4
Farm Bailiffs	316	..	316	393	..	393	+ 77	+ 24.3
Labourers	18,678	700	19,378	16,851	610	17,461	-1917	- 9.8
Shepherds	637	..	637	588	..	588	- 49	- 7.6
Machine Proprietors and Attendants }	50	..	50	79	..	79	+ 29	+ 58
Miscellaneous	38	..	38	32	..	32	- 6	..
Total for Warwick	23,093	1090	24,183	21,030	856	21,886	-2297	-9.5 nearly

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REGISTRATION COUNTIES IN ENGLAND—*continued.*

AGRICULTURAL OCCUPATION.	1871.			1881.			Increase (+) or Decrease (—) of 1881 over or under 1871.	Percentage of Increase or Decrease.
	Males.	Fem.	Total of both Sexes.	Males.	Fem.	Total of both Sexes.		
WESTMORLAND.								
Farmers & Graziers	2,443	252	2,695	2,379	210	2,589	— 106	— 3·9
Farm Bailiffs	72	..	72	81	..	81	+ 9	+ 12·5
Labourers	3,860	319	3,679	2,994	192	3,186	— 493	— 13·2
Shepherds	51	..	51	77	..	77	+ 26	+ 50·9
Machine Proprietors and Attendants .. }	..	..	..	2	..	2	+ 2	..
Miscellaneous ..	17	..	17	9	..	9	— 8	..
Total for Westmord.	5,943	571	6,514	5,542	402	5,944	— 570	— 8·7
WILTSHIRE.								
Farmers & Graziers	2,977	275	3,252	2,809	202	3,011	— 241	— 7·4
Farm Bailiffs	270	..	270	378	..	378	+ 108	+ 40
Labourers	24,866	3885	28,251	21,611	1884	23,495	— 4756	— 16·8
Shepherds	1,885	..	1,885	1,277	..	1,277	— 108	— 7·7
Machine Proprietors and Attendants .. }	50	..	50	131	1	132	+ 82	+ 164
Miscellaneous ..	32	1	33	54	1	55	+ 22	..
Total for Wilts.	29,080	4161	33,241	26,260	2088	28,348	— 4893	— 11·7
WORCESTERSHIRE.								
Farmers & Graziers	2,669	361	3,030	2,450	279	2,729	— 301	— 9·9
Farm Bailiffs	310	..	310	335	..	335	+ 25	+ 8
Labourers	14,075	1375	15,450	13,620	1237	14,857	— 593	— 3·1
Shepherds	267	..	267	247	..	247	— 20	— 7·4
Machine Proprietors and Attendants .. }	33	..	33	55	..	55	+ 22	+ 66·6
Miscellaneous ..	48	..	48	52	..	52	+ 4	..
Total for Worcester.	17,402	1736	19,138	16,759	1516	18,275	— 863	— 4·4
YORKSHIRE. (EAST RIDING.)								
Farmers & Graziers	4,014	259	4,273	3,425	224	3,649	— 624	— 14·6
Farm Bailiffs	384	..	384	585	..	585	+ 201	+ 52·3
Labourers	16,379	670	17,049	15,100	530	15,630	— 1419	— 8·3
Shepherds	471	..	471	669	..	669	+ 198	+ 42
Machine Proprietors and Attendants .. }	69	..	69	100	2	102	+ 33	+ 47
Miscellaneous ..	42	1	43	71	..	71	+ 28	..
Total for Yorkshire (East Riding) }	21,359	930	22,289	19,950	756	20,706	— 1593	— 7·1

Population of England and Wales, &c., of 1871 and 1881. 123

REGISTRATION COUNTIES IN ENGLAND—continued.

AGRICULTURAL OCCUPATION.	1871.			1881.			Incr. (+) or Decr. (-) of 1881 over or under 1871.	Percentage of Increase or Decrease.
	Males.	Fem.	Total of both Sexes.	Males.	Fem.	Total of both Sexes.		
YORKSHIRE. (NORTH RIDING.)								
Farmers & Graziers	6,923	629	7,552	6,169	621	6,790	- 762	- 10
Farm Bailiffs	320	..	320	483	..	483	+ 163	+ 51.9
Labourers	15,214	1034	16,248	14,833	701	15,534	- 714	- 4.3
Shepherds	392	..	392	390	..	390	- 2	- .51
Machine Proprietors and Attendants .. }	35	..	35	49	2	51	+ 16	+ 45 almost
Miscellaneous ..	71	1	72	101	..	101	+ 29	..
Total for Yorkshire (North Riding) }	22,955	1664	24,619	22,025	1324	23,349	-1270	- 5.1
YORKSHIRE. (WEST RIDING.)								
Farmers & Graziers	17,472	1673	19,145	15,638	1370	17,008	-2137	- 11.1
Farm Bailiffs	573	..	573	747	..	747	+ 174	+ 30.3
Labourers	29,635	2002	31,637	28,805	1892	30,697	- 940	- 2.9
Shepherds	292	..	292	332	..	332	+ 40	+ 13.6
Machine Proprietors and Attendants .. }	119	..	119	133	4	137	+ 18	+ 15.1
Miscellaneous	148	2	150	173	1	174	+ 24	..
Total for Yorkshire (West Riding) .. }	48,239	3677	51,916	45,828	3267	49,095	-2821	- 5.4

WALES.

ANGLESEY.								
Farmers & Graziers	1,528	294	1,822	1,448	308	1,756	- 66	- 3.6
Farm Bailiffs	11	..	11	29	..	29	+ 18	+163.6
Labourers	2,388	232	2,620	2,233	82	2,315	- 305	- 11.6
Shepherds	2	..	2	1	..	1	- 1	..
Machine Proprietors and Attendants .. }	..	..	..	8	..	8	+ 8	..
Miscellaneous	..	..	..	..	..	..	..	..
Total for Anglesey	3,929	526	4,455	3,719	390	4,109	- 346	- 7.7
BRECON.								
Farmers & Graziers	2,118	252	2,370	1,938	201	2,139	- 231	- 9.7
Farm Bailiffs	97	..	97	86	..	86	- 11	- 11.3
Labourers	3,347	254	3,601	2,561	181	2,692	- 909	- 25.2
Shepherds	144	..	144	147	..	147	+ 3	..
Machine Proprietors and Attendants .. }	5	..	5	9	..	9	+ 4	..
Miscellaneous	1	1	2	14	..	14	+ 12	..
Total for Brecon ..	5,712	507	6,219	4,755	382	5,087	-1182	- 18.2

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REGISTRATION COUNTIES IN WALES—*continued.*

AGRICULTURAL OCCUPATION.	1871.			1881.			Increase (+) or Decrease (—) of 1881 over or under 1871.	Percentage of Increase or Decrease.
	Males.	Fem.	Total of both Sexes.	Males.	Fem.	Total of both Sexes.		
CARDIGAN.								
Farmers & Graziers	4,780	947	5,727	4,480	1091	5,571	— 156	— 2·7
Farm Bailiffs	75	..	75	64	..	64	— 11	— 17·8
Labourers	5,317	1557	6,874	4,596	1235	5,831	— 1043	— 17·8
Shepherds	120	..	120	131	..	131	+ 11	+ 9
Machine Proprietors and Attendants .. }	3	..	3	5	..	5	+ 2	..
Miscellaneous	15	3	18	8	..	8	— 10	..
Total for Cardigan	10,310	2507	12,817	9,284	2326	11,610	— 1207	— 9·4
CARMARTHEN.								
Farmers & Graziers	4,041	723	4,764	3,798	651	4,449	— 315	— 6·6
Farm Bailiffs	41	..	41	65	..	65	+ 24	+ 58·5
Labourers	4,001	1387	5,388	3,242	957	4,199	— 1189	— 22
Shepherds	29	..	29	20	..	20	— 9	— 31
Machine Proprietors and Attendants .. }	..	..	..	..	..	..	..	..
Miscellaneous	28	..	28	17	..	17	— 11	..
Total for Carmarthen	8,140	2110	10,250	7,142	1608	8,750	— 1500	— 14·6
CARNARVON.								
Farmers & Graziers	3,137	618	3,755	2,925	649	3,574	— 181	— 4·8
Farm Bailiffs	61	..	61	68	..	68	+ 7	+ 11·4
Labourers	4,765	351	5,116	4,602	260	4,862	— 254	— 4·9
Shepherds	41	..	41	53	..	53	+ 12	+ 29·2
Machine Proprietors and Attendants .. }	3	..	3	19	..	19	+ 16	..
Miscellaneous	8	1	9	1	..	1	— 8	..
Total for Carnarvon	8,015	970	8,985	7,668	909	8,577	— 408	— 4·5
DENBIGHSHIRE.								
Farmers & Graziers	3,018	457	3,475	2,688	435	3,123	— 352	— 10·1
Farm Bailiffs	124	..	124	137	..	137	+ 13	+ 10·4
Labourers	5,415	473	5,888	4,867	239	5,106	— 782	— 13·2
Shepherds	67	..	67	80	..	80	+ 13	+ 19·4
Machine Proprietors and Attendants .. }	..	..	..	16	..	16	+ 16	..
Miscellaneous	26	..	26	10	..	10	— 16	..
Total for Denbigh- shire }	8,650	930	9,580	7,798	674	8,472	— 1108	— 11·7

REGISTRATION COUNTIES IN WALES—continued.

AGRICULTURAL OCCUPATION.	1871.			1881.			Increase (+) or Decrease (—) of 1881 over or under 1871.	Percentage of Increase or Decrease.
	Males.	Fem.	Total of both Sexes.	Males.	Fem.	Total of both Sexes.		
FLINTSHIRE.								
Farmers & Graziers	713	125	838	669	117	786	— 52	— 6·2
Farm Bailiffs	34	..	34	53	..	53	+ 19	+ 55·8
Labourers	1,311	122	1,433	1,126	71	1,197	— 236	— 16·4
Shepherds	20	..	20	19	..	19	— 1	— 5
Machine Proprietors and Attendants .. }	1	..	1	1	..	1	No change	..
Miscellaneous ..	3	..	3	10	..	10	+ 7	..
Total for Flintshire	2,082	247	2,329	1,878	188	2,066	— 263	— 11·2
GLAMORGAN.								
Farmers & Graziers	3,178	449	3,627	2,853	410	3,263	— 364	— 10
Farm Bailiffs	165	..	165	177	..	177	+ 12	+ 7·2
Labourers	4,801	584	5,385	4,275	495	4,770	— 615	— 11·2
Shepherds	107	..	107	98	..	98	— 9	— 8·3
Machine Proprietors and Attendants .. }	3	..	3	3	..	3	No change	..
Miscellaneous ..	12	..	12	7	..	7	— 5	..
Total for Glamorgan	8,266	1033	9,299	7,418	905	8,318	— 981	— 10·5
MERIONETH.								
Farmers & Graziers	2,720	423	3,143	2,474	414	2,888	— 255	— 8·1
Farm Bailiffs	60	..	60	52	..	52	— 8	— 13·3
Labourers	3,327	327	3,654	2,843	218	3,061	— 593	— 16·1
Shepherds	53	..	53	84	..	84	+ 31	+ 58·1
Machine Proprietors and Attendants .. }	7	..	7	6	..	6	— 1	..
Miscellaneous ..	5	..	5	11	..	11	+ 6	..
Total for Merioneth	6,172	750	6,922	5,470	632	6,102	— 820	— 11·8
MONTGOMERY.								
Farmers & Graziers	3,690	501	4,191	3,357	467	3,824	— 367	— 8·7
Farm Bailiffs	178	..	178	133	..	133	— 45	— 25·2
Labourers	5,661	446	6,107	5,073	299	5,372	— 735	— 12
Shepherds	78	..	78	105	..	105	+ 27	+ 34·5
Machine Proprietors and Attendants .. }	20	..	20	19	..	19	— 1	..
Miscellaneous ..	18	..	18	44	..	44	+ 26	..
Total for Montgomery	9,645	947	10,592	8,731	766	9,497	— 1095	— 10·3

REGISTRATION COUNTIES IN WALES—*continued.*

AGRICULTURAL OCCUPATION.	1871.			1881.			Increase (+) or Decrease (-) of 1881 over or under 1871.	Percentage of Increase or Decrease.
	Males.	Fem.	Total of both Sexes.	Males.	Fem.	Total of both Sexes.		
PEMBROKE.								
Farmers & Graziers	2,596	533	3,129	2,463	464	2,927	- 202	- 6.3
Farm Bailiffs	37	..	37	44	..	44	+ 7	+ 18.9
Labourers	4,405	1067	5,472	3,867	741	4,608	- 864	- 15.6
Shepherds	16	..	16	16	..	16	No change	..
Machine Proprietors and Attendants .. }	..	..	..	..	..	..	..	..
Miscellaneous ..	10	..	10	6	..	6	- 4	..
Total for Pembroke	7,064	1600	8,664	6,396	1205	7,601	- 1063	- 12.2
RADNOR.								
Farmers & Graziers	1,159	127	1,286	998	101	1,099	- 187	- 14.5
Farm Bailiffs	57	..	57	44	..	44	- 13	- 22.8
Labourers	2,123	69	2,192	1,611	41	1,652	- 540	- 24.6
Shepherds	64	..	64	76	..	76	+ 12	+ 18.7
Machine Proprietors and Attendants .. }	..	..	..	3	..	3	+ 3	..
Miscellaneous ..	8	..	8	11	..	11	+ 3	..
Total for Radnor	3,411	196	3,607	2,743	142	2,885	- 722	- 20

V.—Report on Agricultural Education :—a Summary. By
HERBERT J. LITTLE, Coldham Hall, Wisbech.

THE Royal Commission to inquire into "technical instruction," issued in 1881, concluded its labours in 1883. Not, however, until 1884 were the Blue-books which contain a summary of its work given to the public.

The Royal Mandate states that "it is deemed expedient that a Commission should forthwith issue to inquire into the instruction of the industrial classes of certain foreign countries in technical and other subjects, for the purpose of comparison with that of the corresponding classes in this country, and into the influence of such instruction on manufacturing and other industries at home and abroad."

In pursuance of this object the Commissioners entrusted the whole inquiry into Agricultural Education to Mr. H. M. Jenkins, appointing him a sub-commissioner, and instructing him to furnish them with a Report on the teaching of Agriculture

in France, Germany, Denmark, Holland, and the United Kingdom.

Few persons will be disposed to deny the eminent fitness of Mr. Jenkins for the post in question. His previous labours on the Agricultural Commission, and the numerous reports which at various times, since he became Secretary of the Royal Agricultural Society, he has made for this 'Journal' on matters connected with foreign agriculture, together with his linguistic attainments and his great industry, marked him out as in every respect fitted for this inquiry; whilst his position in this Society has given him great opportunities of acquainting himself with the means which have been adopted in this country for furthering Agricultural Education. It is no small credit to Mr. Jenkins that the separate nominations of Lord Spencer, then Lord President of the Council, and Mr. Dent, President of the Royal Agricultural Society, both fell on him.

In December, 1882, Mr. Jenkins's Report was completed, and, with its Appendix, forms the major portion of the second of the two volumes issued by the Commissioners.

Now if there is one thing which more than another the ordinary English reader dreads to tackle, it is the ponderous volumes issued in such variety by the Government printers for the instruction of our legislators, the blue covers and general aspect of which are in themselves sufficient to frighten away at first sight all but industrious students. The volumes in question are for this reason too likely to remain sealed books to the majority of agricultural readers, especially as they are, as a rule, difficult to obtain except through second-hand booksellers. It has therefore been thought desirable that some account should be given in this 'Journal' of such portions of the work in question as are likely to prove most interesting to English agriculturists, and that at least the opportunity should be given of instituting comparisons of our own and foreign educational institutions. Agriculture in this country is yearly becoming invested with greater difficulties and responsibilities. If, therefore, anything is to be learned from our neighbours in the matter of technical instruction, it is the duty of this Society to make its members acquainted with the circumstances under which agricultural education is conducted on the Continent; and it is with the feeling that Mr. Jenkins' labours were likely to remain partially neglected by agricultural readers, that I have undertaken to prepare for the 'Journal' an epitome of the more important points brought before the public in the Report in question, and briefly to summarise the conclusions arrived at by the Commission. The estimation in which the Report has been held, since its publication, both at home and abroad, may

be judged from the fact that the United States Government has ordered 20,000 copies of it to be printed and distributed in America.

Mr. Jenkins's instructions included an inquiry into the—

(A.) *Higher Agricultural Education*, or such as may be reasonably regarded as suitable for "gentlemen farming their own land, their sons, their managers or stewards, and also of large tenant-farmers."

(B.) *Intermediate Agricultural Education*, or such as may be suitable for "farm bailiffs and small tenant-farmers."

(C.) *Lower Agricultural Education*, or such as may be suitable for "farm labourers and peasant proprietors."

(D.) *Instruction in the Rudiments of Agriculture* in elementary public schools; and in England, under the Science and Art Department.

Mr. Jenkins points out, however, that such classification is only of partial applicability; that in France for instance, "the Agricultural Education of Classes (B.) and (C.) is practically the same, while in England Intermediate Agricultural Education (B.) is applicable only to sons of ordinary tenant-farmers, small land-agents and farm managers. In North Germany, on the other hand, farm-labourers rarely emerge from the class to which they were born, and therefore receive no education beyond that given at the village school, which, however, they are bound to attend until they are 14 years of age, or until they know enough of the Church Catechism to enable them to be confirmed; whereas in Württemberg, their compulsory education does not cease till they are eighteen years of age, the four years' additional instruction being given in evenings, and to some extent on technical subjects connected with their calling."

Mr. Jenkins devotes a few words at the outset to the difficulties of the subject of Agricultural Education. Opinions differ very greatly on nearly all educational questions; but when technical instruction is involved, and when its consideration is mixed up with that of general education, the diversities of opinion met with appear almost hopelessly irreconcilable. The difficulties in the case of an ordinary trade are increased enormously in the case of agriculture, for a reason which is peculiar to the cultivation of the soil. "A bootmaker, a weaver, a glass-blower, or in fact any other artizan, can pursue any department of his calling at any time; and he can teach an apprentice how to perform all the necessary operations every day in every week of the year, if he enjoy health and strength, and has work to do; but the teaching of agriculture means the instruction how to perform a long series of operations, each one of which can only be done during a limited time once or

twice in the course of a year. If, therefore, a farm pupil fails to grasp how, for instance, to prepare a stubble for the succeeding crop, he and his teacher must be content to wait nearly twelve months before the lesson can be resumed. This peculiar difficulty pertaining to technical instruction in agriculture is too often lost sight of by those who argue solely from first principles, as well by those who do not distinguish sufficiently between the kind and amount of technical instruction necessary for the land-owner, the land-agent, the tenant-farmer, the farm-bailiff, and the labourer respectively."

Again, how is agriculture to be taught? Is it to be looked upon as a science? or an art? or a business? "If it be a science, it can be taught at a school or college, with an experimental field as a laboratory, in a manner analogous to that in which chemistry is taught. If it be an industrial art, it cannot be properly taught without a workshop (that is to say, a real farm for the exercise of the pupils); and if it be a business, it cannot be taught at all, except by a regular system of apprenticeship ending in almost a partnership, or at any rate in very confidential relations as to money matters between the apprentice and his master."

From an educational point of view there is, no doubt, a considerable distinction between agriculture as an art and farming as a business. Mr. Jenkins's Report is, in a great measure, devoted to a description of the methods adopted in European countries for the instruction of all grades of agriculturists; and leaving these subtle distinctions as to terms, which concern us little in this paper, let us turn to his pages, and find how the best wits have been employed in building up the fabric of agricultural education on the Continent. I shall premise that it is my intention, as far as possible, to let Mr. Jenkins tell his story in his own words, my object being to bring out the salient points of his Report, letting him, for the most part, speak for himself.

GERMANY.

In this country Agricultural Education has long been recognised as a subject of importance, and some interest is attached to a School of Dairying for farmers' daughters, established as long ago as 1722 by King Frederick William I. at Könighorst, in Brandenburg. The interest taken by this monarch in this institution is shown by the circumstance that he not infrequently acted as judge of the merits of the butter, and that a prize of 100 marks was given by him annually as a contribution to the dowry of the most successful maiden in this branch of dairy practice.

"In Prussia at the present time there is an elaborate system of agricultural education for all except the labouring classes, based on the principle that theoretical instruction only can be properly given at schools and colleges. At some institutions, however, the necessity of a combination of practice with science has been recognised, and there in consequence a farm has been added to the school, or arrangements with a neighbouring farmer have been made. Under any circumstances, and in schools and colleges of all grades, eye-teaching is resorted to as much as possible. Indeed, the Botanic Gardens, specimen plots, collections of implements, natural-history objects, anatomical specimens, models of fruits, vegetables, &c., diagrams, and other means of instruction, are not the least remarkable adjuncts to even a low-grade agricultural school. At the same time it must be remembered that, with perhaps the exception of the Agricultural Institutes forming part of the teaching apparatus of the Universities, none of the so-called agricultural schools are exclusively devoted to the teaching of agriculture. All the other subjects which form part of a liberal education are taught; and agriculture, with the sciences of which it is the application, takes only the time which in other schools would be devoted to acquiring proficiency in the dead languages and advanced mathematics."

Landwirthschaftsschulen.—The chief object, however, of the higher agricultural schools (*Landwirthschaftsschulen*), which it has been before noted are distinct from the Agricultural Institutes, is to enable the sons of farmers to qualify for the right to one year's voluntary service in the army, instead of undergoing the ordinary service, which is compulsory on all German subjects. Instead of serving as private soldiers for three years, the one-year volunteers serve as sub-officers for twelve months, during which they find their own quarters and rations. The education at these schools is of a somewhat stringent character, as in time of war the additional officers required are drawn from their ranks; the higher grades of agricultural educational institutions have therefore distinct and definite relations to the military service of the Empire. From a list of subjects given by Mr. Jenkins in Appendix I., page 329, it is evident that the examinations at these schools in languages and sciences are of a high character.

Entrance to the higher agricultural schools is open only to those who have attained a certain standing at an ordinary school of the first, second, or third rank, which schools are respectively designated as *Gymnasium*, *Realschule*, and *Bürgerschule*. The lower the grade of school, the higher the position in it which the pupil must have attained before he can enter a

high grade school. Most of the higher agricultural schools have, however, a preparatory school attached, where pupils can qualify for entrance by examination.

But even this list does not exhaust the catalogue of the German Agricultural Schools. Below the above in rank come the *Ackerbauschulen*, where the instruction is more elementary, and where there is no question of one year's service in the army. Moreover, in addition to these, in all of which the instruction is continuous, there are vast numbers of *Fortbildungsschulen* (Improvement Schools), where the instruction is intermittent, being given in winter or in evenings only, as the case may be. Nor would it be right in this enumeration entirely to omit the various dairy, shoeing, and house-keeping schools, more or less of a special nature, but in some sense connected with the education of the future cultivators of the soil.

High School, Berlin.—Of the German Agricultural Institutes, where purely scientific instruction is given, the first which demands attention is the Royal Agricultural High School at Berlin. "This magnificent establishment, though not complete in all its details, is sufficiently equipped to command the first place in an account of the German Agricultural Schools. Some idea of its extent may be obtained by a notice of its measurement. The main building is in round numbers about 240 feet long, and 180 feet deep. The central hall, which is covered with glass, has a superficial area of about 1250 square yards, and round it the chief structure rises in three stories above the basement.

"In the central hall is a very complete collection of agricultural implements, all of which are lent by the makers, who remove them from time to time, in order to replace them with others combining their most recent improvements. The machinery in this hall can be set in motion and worked by steam power through shafting and pulleys which traverse it. On Saturday afternoons it is not unusual to have an exhibition of threshing and other power-driven machines exhibited in motion."

The Botanical, Zoological, Zootechnical, and Mineralogical Collections of this establishment are very complete; for instance, the Botanical Collection includes no less than 2600 specimens of woods, and over 18,000 specimens of different sorts of corn, seeds and fibres. The ample laboratory accommodation is a great feature, no less than thirteen apartments being devoted to the prosecution of studies and researches in morphological and physiological botany.

The names of many of the professors in this Institution are well known to scientific circles in England, and it is needless to say that the lectures are of a high standard. The fees

payable are about 5*l.* per student per half year, with certain extras for courses of practical chemistry, &c. At present this Institution demands a large amount of State aid, not far short of 100*l.* per pupil of every description having been granted by the Government towards its expenditure in 1881.

Halle.—The Agricultural Institute in connection with the University at Halle is so highly esteemed in Germany, that some reference to it is necessary here. The means of instruction at Halle are similar to those at Berlin, but with these additions:—(1) that the Agricultural Institute being an integral part of the University, and situated in the midst of it, all the general collections are quite as accessible to the agricultural students as the special collections belonging to the Institute itself; (2) that the garden of the Agricultural Institute at Halle enables a more practical instruction to be given than is possible at Berlin on account of its extent and of the purposes to which it is devoted; (3) that the thoroughly scientific and practical manner in which the experimental field of nearly 100 acres has been laid out and is managed, gives a special opportunity for completing the technical education of the students; and (4) that the opportunities afforded for learning veterinary practice in the Institute itself, places within the reach of the students facilities for acquiring that kind of knowledge which can never be obtained elsewhere. The botanical part of the garden is interesting, but the zoological part of it appears to be unique. The object is apparently to keep a sufficient number of farm animals of different varieties, together with certain other useful kinds and crosses, so as to enable the professors to illustrate their lectures by means of living specimens; but whilst excellent typical specimens must form the best method of instruction, it is obvious that monstrosities can be of no use in the teaching of students. Yet such curiosities, as crosses with the *yak*, are kept in the zoological garden at Halle.

The esteem in which the instruction at Halle is held, may be inferred from the fact that, though only founded in 1863, and started with three agricultural students, from 1870 to 1880 during the winter half year, the numbers averaged fully two hundred. The course of instruction extends over two years; but for those students preparing themselves for teachers of agriculture the course is of fully three years' duration. The fees are exceedingly moderate, *e.g.* matriculation, 17*s.* 3*d.*; reading-room, 6*s.*; both for the whole period of study; whilst the total amount of other fees is 6*l.* to 7*l.* 10*s.* per session (half-year), exclusive of 10*s.* for the "leaving certificate." Students provide themselves with board and lodging; but a tariff is published by the authorities, from which it appears that the

cost of living and instruction is only between 30*l.* and 40*l.* per annum, inclusive of everything.

Great benefits are claimed by Professor Kuhn, the director, for the agriculture of the Province of Saxony, from the influence of the teaching of this school. He affirms that he himself can bear witness to the establishment in the district of "a more rational rotation of crops, a more liberal manuring of the land, and a better cultivation of the soil, especially where sugar-beet is grown." And, moreover, he asserts that some of the best cattle-breeders in Germany owe their success to the instruction which they received at Halle. As regards economy of labour, he points out also that while the more "intensive" cultivation of the land, especially in sugar-beet districts, has necessarily led to the employment of more manual labour, at the same time the use of the steam plough and other improved means of cultivation have diminished the number of horses which it was formerly necessary to employ on a specific acreage.

Göttingen.—The distinctive feature of the next German Agricultural Institute mentioned by Mr. Jenkins, namely that of the Royal University of Göttingen, consists in an arrangement made by the directors with the tenant of a farm of between 1600 and 1700 acres for the privilege of instruction of students upon it from time to time. The tenant of the farm acts as demonstrator when required. Though this is a distinct advance upon the method of teaching employed at Berlin and Halle, yet it would seem that even in this case such a method does not compare favourably with that of our own Royal Agricultural College at Cirencester, for at Göttingen only the results of the processes of cultivation, manuring, &c., are shown, and *not the best means of performing the various acts of husbandry.* The experiments carried out at Göttingen seem elaborate and of considerable importance. "The results obtained are published from time to time in the 'Journal für Landwirtschaft,' as well as in Jenssen's 'Jahresbericht.' One apparatus alone for collecting and analysing the air breathed by, and the other excreta of, two sheep with a view to determine the manner in which their food is utilised or wasted, cost about a thousand pounds, exclusive of the steam-engine, which is an adjunct to it."

Hohenheim.—In Mr. Jenkins's opinion, however, the most perfect embodiment in Germany of the combination of practice with science is to be found at the Agricultural Academy of Hohenheim, in Würtemberg, only about 7 miles from Stuttgart. To this Institution Mr. Jenkins awards the high praise of describing it as almost the perfection of an establishment for higher agricultural education. The Hohenheim Academy is very extensive. The building itself was formerly a ducal

palace, and the State domain of Great Hohenheim is in the occupation of the authorities of the Academy. It contains ample and well-arranged collections, which it is unnecessary to enumerate. The means of instruction at Hohenheim, however, are of a different character from those at any of the establishments already described. The farm comprises about 760 acres, of which 480 are arable, and 108 grass. The more important of the other divisions are—experimental field, 20 acres; botanic-garden, 15 acres; fruit-tree nursery, 15 acres; hop-garden, 3 acres. In addition, smaller plots of land are devoted to mulberry-plants, vines, forest experiments, &c. The rotations adopted on the arable land are noteworthy. They differ so materially from those common in Great Britain, that it may be worth while to transcribe them here.

- | | | |
|-------------------------------------|---|--|
| a. (1) Vetches for fodder, manured. | b. (1) Rape for seed. | c. (1) Beans and green maize, manured. |
| (2) Rape for seed. | (2) Rye, with red clover. | (2) Winter wheat. |
| (3) Wheat. | (3) Clover mowed. | (3) Green crops. |
| (4) Green crops. | (4) " fed. | (4) Spring corn and clover. |
| (5) Barley with clover. | (5) Oats. | (5) Clover. |
| (6) Clover. | (6) Green crops and potatoes. | (6) Clover. |
| (7) Spelt. | (7) Rye, with white clover and grass seeds. | (7) Spelt. |
| | (8) Grass mown. | (8) Lucerne. |
| | (9) " fed. | (9) Lucerne. |
| | (10) St. John's rye and fallow. | |

"The equipment of a farm on so considerable a scale enables the student to become practically acquainted with the management of live-stock and implements. The principles enunciated in the lecture-room are illustrated in the natural course of events." Twelve working horses and eight draught oxen are kept. Some of the horses are bred on the farm. The cattle number nearly a hundred, and belong for the most part to the Swiss Simmenthal breed; about one-half of them are milch cows. Good opportunities are therefore afforded for studying cattle-breeding and dairying. The flock consists of about 525 sheep, chiefly a cross of the native breed with Merinos. About 300 are ewes. Pure Merino and other sheep are kept to a certain extent, as well as some crosses with Southdowns.

The cost of instruction at this Institution is exceedingly moderate. Students who are natives of Württemberg pay only 9*l.* for instruction; while foreigners pay 25*l.* the first year, and 17*l.* 10*s.* each year afterwards. Most of the students are resident, and the natives pay 1*s.* per day for their room, and

find their own bed, bedding, and towels; while strangers pay 2s. per day, and have these things provided for them. A well-arranged restaurant belongs to the Academy, and students can live as cheaply, or almost as extravagantly, as they choose. About 2s. per day is estimated to be the cost of food on a moderate scale. Students are not compelled to take their meals at this restaurant. There are other inns in the neighbourhood to which they may resort. They may also lodge in private houses, if they prefer that to taking rooms in the Academy buildings, but in such case they are not entirely relieved of payments for lodging. Notwithstanding the great inducements offered by the low terms to natives of Würtemberg, it appears that at Mr. Jenkins's visit only one-third of a total of seventy students or thereabouts belonged to that State. Only about twenty or thirty students take their half-yearly certificates, and not more than two or three their final diploma in any year. The course of study extends over two years, in four half-yearly sessions.

The State grant to this fine Institution exceeds 5000*l.* per annum. If therefore the number of students averages seventy, the State contributes about 73*l.* per head towards the expenses of maintaining it, without taking into account the cost of land and buildings, nor the payments made by the students themselves for instruction and living.

With this example of the liberal manner in which a minor State consents to endow and uphold an Agricultural Educational Institution, Mr. Jenkins concludes his report on the higher agricultural teaching of Germany. It is almost unnecessary to observe that many Institutions of importance mentioned by Mr. Jenkins, have been passed over unnoticed by me. Of such are the Academy at Poppelsdorf, near Bonn; the Agricultural Institute of the Royal University of Königsberg; and others at Kiel, Breslau, Munich, Leipzig, Giessen, Jena, &c.

INTERMEDIATE AGRICULTURAL EDUCATION IN GERMANY.

The main object of the *Landwirthschaftsschulen* has been already explained; but this appellation seems somewhat of a misnomer, as these schools are far more than purely agricultural. It may be well to explain then that, whilst a *Gymnasium* is a school at which a liberal education of a classical tendency is given, and a *Realschule* stands on the same level, with the exception that in it the education is more devoted to mathematics and modern languages; at the *Landwirthschaftsschulen* an equivalent education is supplied, in which languages and

mathematics are to a large extent replaced by the natural sciences and the principles of agriculture.

Every province of the Prussian monarchy, with the single exception of that of Saxony (not the kingdom), now possesses at least one of these schools, and several have two. The number of agricultural students at these academies varies from 30 to upwards of 150. The schools are not exactly State Institutions, though they all receive a State subvention, which is contributed in the form of aid to the funds of the district, or to the association by which they have been organized. This subvention seems to vary considerably. Whilst at the important school of Hildesheim it only amounts to about 6*l.* per head on the total number of students, at Weilburg (including 372*l.* received from the local authorities) it appears that a subsidy of 40*l.* per student is enjoyed. It may be well here to enforce still further the remark which was made a few pages back as regards the special value of these intermediate schools to agriculturists, as entitling them to the important privilege of one year's voluntary service in the army. Until their establishment, agriculturists were compelled to send their sons to the higher schools for general education to obtain this right. As at these schools foreign languages or Greek and Latin formed the chief element of instruction, it is obvious that the establishment of agricultural schools of the same grade and with the same rights, together with the advantages of an education more suited to landowners and large farmers, gave them a considerable advantage over the former class of schools. Herr Matzat, the director of the school at Weilburg, to whom Mr. Jenkins is indebted for some useful information, remarks that the right to the one year's voluntary army service is the *punctum saliens* of high-class education in Germany. Without this right it might be thought sufficient for many youths if they received only an elementary education. It seems now that no high school flourishes if its final certificate does not carry this right, and M. Matzat therefore considers the establishment (since 1875) of these schools a most important advance in the system of agricultural education in Germany. The *Landwirthschaftsschulen* are organised on a basis of a three years' course of instruction ; but it is allowed to have under the same management a preparatory school for those boys who intend to become students, but who are not yet qualified to enter the higher school. Only those students who intend to go through the whole course of study and to pass the final examination are allowed to enter as pupils of the agricultural schools. No exception is made in favour of any student to excuse him from pursuing any of the subjects mentioned in the study plan. It is necessary to note that pupils of the preparatory school are

not compelled to pass on to the agricultural school in these academies, though under certain circumstances they are allowed to profit by the instruction there given in foreign languages.

Hildesheim.—According to statistics given by Mr. Jenkins as to the number of pupils, subsidies, and quantity of land attached to these farms in Prussia, it appears that the school at Hildesheim stands in the front rank as regards the number of pupils, and more especially as to the exceedingly large proportion of the students who enter for agricultural subjects. Mr. Jenkins remarks also that the fees charged are higher than at any other school of the sort, though this remark may seem absurd to Englishmen when they learn that these fees only amount to about 10*l.* per annum. Dr. Michelsen, the director of this school, has selected, for the two foreign languages taught, Latin and English, from the following considerations:—The school is situated in the province of Hanover, and therefore there is more commercial and other intercourse with England than with any other country. Had it been situated in South Germany, Dr. Michelsen admits that he should have adopted French as the modern language to be taught; and as regards Latin, he wisely looks upon some knowledge of it as essential to the proper study of the natural sciences, as so many technical terms are derived from it, and the names of plants and animals are constructed on a Latin basis. About nine-tenths of the pupils are the sons of small proprietors or tenant farmers, and the remainder of wealthier people; and though the majority of them are Hanoverian, a small percentage of Dutch, Danish, Russian and French are found among their numbers. Mr. Jenkins particularly noted at this school the collections of natural history objects and microscopical preparations as being marvellously well adapted for teaching in a school of this kind. No fewer than a dozen microscopes are employed in the demonstration lectures; and although these instruments did not cost more than 50*s.* each, they are equal to the definition of objects which require no higher power for their observation than ‘rust’ and ‘mildew’ in wheat, and similar substances, which are well illustrated in the collection. Excursions to farms in the neighbourhood are frequently made.

A few special features in two other of these establishments, namely those of Weilburg on the Lahn, and Bitburg, near Trêves, are noted. At Weilburg the pupil pays 4*l.* per annum in fees, and can obtain board and lodging for as little as 25*l.* per annum. The State subvention is about 900*l.* per annum, or about 15*l.* per student. Most of the pupils after obtaining their final certificate go to study practical agriculture on large farms, either as pupils or volunteers, and are so much sought after in

such capacities by the proprietor-farmers of the province, that the Institution is unable to satisfy their demands.

At Bitburg the farm, which consists of 225 acres, and which, though it is not owned by the School, is placed at the service of the authorities by the director of the local Agricultural Society, who is its proprietor and occupier, is of great use for practical demonstrations and field experiments. Here the pupils are mostly sons of the small landowners in Rhenish Prussia. These men generally farm their own property; their sons, after having passed through the school and served their time in the army, generally go out to obtain some practical knowledge of agriculture before they return to the paternal estate to undertake its management. As in the case of many of the other schools of this class in Germany, Mr. Mucker, the director, considers that the plan of studies is overburdened with subjects, and hopes that eventually it will not be necessary to teach more than one foreign language, and to make some other alterations by which greater proficiency in fewer subjects might be obtained. The opinion of high authorities, such as that of Privy Councillor Dünkelberg, director of the Agricultural Academy at Poppelsdorf, is that the combination of technical with general education is faulty, and that by this combination the instruction in agriculture essentially suffers. And another authority, the Economy-Counsellor Petersen, states that he regards the combination of the qualification for the voluntariat with agricultural instruction as prejudicial to the future of the student.

Mr. Jenkins thus sums up his own opinion of these schools. "My own impression of the education given at these schools was that they did not exceed in scope, and certainly not in depth or breadth, the instruction given in our English county schools, at some of which the principles of agriculture are taught with no inconsiderable success. It must also be borne in mind that none of the German schools of this class are 'boarding-schools,' but that the pupils, except when their parents live in the town in which the school is situated, are deprived out of school hours of the supervision both of parents and schoolmasters. Rules are of course made to control the conduct of the pupils when out of school, but compliance with them must, to a large extent, depend upon the efficiency of a kind of police supervision, which to English ideas seems scarcely desirable as a means of regulating the conduct of youths between 15 and 18 years of age."

LOWER AGRICULTURAL EDUCATION.

We now come to the important subject of *Ackerbauschulen* or Farming schools, as Mr. Jenkins calls them, and similar esta-

establishments in which there is no question of one year's voluntariat. There are two distinct types of these schools, namely those which form lower classes, so to speak, of the intermediate agricultural schools mentioned above, and where the instruction given is purely theoretical, and those established in country districts in connection with a farm, and where practical instruction is combined with theoretical and general education. The former are generally day-schools, and the latter almost always boarding-schools. In the kingdom of Prussia there are no less than thirty-two of the "farming schools," in Saxony three, and in Würtemberg four, all of which combine practice with school instruction. These schools are under the control of the provincial administrations, which receive a subvention from the State towards their maintenance.

The State grants in Prussia towards these schools amount to nearly 7000*l.*, while the provincial grants in aid of the same schools are upwards of 10,000*l.*

The cost of this kind of education may be gleaned from an example of a boarding-school at Bremervörde, in Hanover. The fees payable by pupils here are as follows per annum :—

	£	s.	d.
Board and lodging, exclusive of bed, light, and washing	18	0	0
School fees	4	10	0
Drawing materials	0	18	0
Text-books	0	16	6
Stationery, printed forms, &c.	0	12	0
Scientific instruments and sundries	0	7	6
Total	£25	4	0

Most of the students bring their own bed and bedding at these establishments, and the whole course of instruction, which is completed in eighteen months, can therefore, it seems, be obtained for about 36 guineas.

At a practical farming-school at Badersleben, in the province of Halberstadt, a farm of 520 acres in extent is attached to the school, which is designed to accommodate seventy pupils. Here about 20*l.* per annum pays for instruction, board and lodging, pupils, as before, bringing their own bedding. Both school and farm are worked at the risk of the Principal, who is a tenant-farmer, and who receives from the provincial authorities a subvention of 7*l.* 10*s.* per pupil per annum. The pupils enter at from 14 to 17 years of age, and are bound to two years' course of instruction. They wear a simple uniform consisting of a blue blouse and linen trousers in summer, and cloth trousers in winter, and great simplicity of living is combined with strict discipline. Although the pupils do not as a rule assist in the

cultivation of the farm, the second year's lads are taken in groups of four, and taught to perform every operation in the field and the homestead. Thus they have just sufficient practical instruction to enable them to accomplish various acts of husbandry themselves; but their time is not taken up by labour on the farm to the detriment of their general and technical education, which comprises arithmetic and mathematics, land-surveying and levelling, history and geography, the natural sciences and theoretical agriculture. These examples may suffice to show the general working of such establishments, most of the directors of which are of opinion that a marked effect has been produced in the agriculture of their districts by their influence. The rotations of crops have been improved, machinery has come into more general use, the quality of the cattle has improved, and manual labour much diminished, owing to the use of machines of a superior type. One desponding director, whom Mr. Jenkins quotes, but whose name he naturally withholds, however avers that, owing to the peculiar character of the peasant population in his district, which he describes as mistrustful and indolent in the highest degree, no direct influence upon the agriculture of the country can be observed, in spite of the example which he has placed before them for the last twenty-five years.

AGRICULTURAL WINTER SCHOOLS.

A common type of educational establishment for the lower classes is found in the Agricultural Winter Schools; and travelling lecturers are also engaged during the summer months to give instruction in theoretical agriculture. Mr. Jenkins points out that such a method of teaching as this would be impracticable in England. Whilst in Germany the school time is relegated to the winter, because there is very little work to be done then on any ordinary peasant farm, on a well-managed English farm there is nearly as much work to be done as in summer, especially in the great sheep districts.

An inspection of the schoolrooms and buildings employed showed that the accommodation was generally of a moderate class, but there was generally a simple physical and chemical apparatus apparently sufficient for the purposes required, and there was always a microscope. Agricultural, zoological, and botanical diagrams were generally to be found upon the walls, and a small museum of natural-history objects was generally the pride of the director.

The object of these agricultural winter schools is to continue the general education of young men who have left the elementary schools, as well as to give them instruction in technical subjects

bearing upon agriculture and in agriculture itself. There are two winter courses, arranged in such a manner, that in the first the general education is continued, and in the second the instruction given is principally technical. Instruction in these schools begins on the 3rd or 4th of November, and concludes with a public examination in March. For the remainder of the year the pupils are employed upon the farms of their parents or otherwise, whilst the director of the school becomes a travelling lecturer and adviser in the district of his school.

A glance at the plan of studies shows that elementary agricultural chemistry, mineralogy, zoology, physics, cattle-breeding, dairying, and book-keeping are all included in the course ; whilst the German language, arithmetic, land surveying, levelling, and drawing are all taught, to complete the pupil's general education.

The outlay at such schools as these is considerable. The expense of furnishing the school with the necessary books, diagrams, and apparatus does not seem large, amounting only, in one instance given, to 44*l.* ; but the annual cost of the establishment, where there were only fifteen to twenty pupils, was estimated at 262*l.* The receipts, at 30*s.* a-head, the fees paid by the pupils, would only amount to about one-tenth the annual expenditure of the school. In this case, as in others, the deficiency is supplied from the funds of the provincial administration, from the Ministry of Agriculture, and from the local Agricultural Society.

The travelling lecturers, who make their rounds in the summer months, are paid generally by the provincial Agricultural Societies, and are under the control of these associations. As an average, their salaries may be stated at about 80*l.* or 100*l.* per annum. It seems to be their function to attempt to draw the attention of agriculturists to the newest discoveries of science and the most successful applications of them to practice.

The foregoing remarks may be considered applicable not only to Prussia, but to the greater part of the remainder of the German empire ; but Würtemberg has long been among the foremost of Continental states in all educational matters. The very complete school at Hohenheim has already been referred to at some length, and lower agricultural education has been by no means neglected. Here then, as elsewhere, farming schools have been established in all the four administrative districts into which the kingdom is divided. They differ somewhat in their organization, however, from some of the farming schools in the other parts of Germany, inasmuch as they are directly subsidised by the State and not by or through the provincial administration or local Agricultural Society, and that the pupils have nothing to pay for their board, lodging, or instruction for three years.

It must be remembered that education is strictly compulsory in Württemberg. Every boy must remain at a school of some kind until he is 14 years of age. Again, if he leaves a regular school at 14, he is compelled to continue his education up to 18 by attending a school established for this special purpose. Originally this was a Sunday-evening school, the instruction given in which was partly general and partly agricultural; but the parish authorities have lately been empowered to do away with such Sunday-evening school, on condition that they established a winter school in its place, with compulsory attendance thereat on two evenings of each week during the six winter months.

Moreover, a series of voluntary improvement schools, where theoretical agriculture is a leading feature, has also been organised. No less than 13,119 scholars attend the obligatory winter evening schools, and 2200 have already entered the voluntary improvement schools. This prosperous little kingdom, moreover, supports twenty-eight farmers' clubs, and travelling lecturers also give courses of instruction somewhat on the lines indicated above.

SPECIAL SCHOOLS.

Dairy Schools.—Of the special schools for the teaching of either theoretical or practical arts connected with agriculture, the most interesting will probably be those connected with the dairy. The most celebrated school of this kind is at Raden, in the Grand Duchy of Mecklenburg-Schwerin. The course of instruction here is given entirely to young men and extends over six months; the pupils number six at a time, and, therefore, twelve may be taught every year. They pay 7*l.* 10*s.* for the six months' instruction, with board and lodging in the farm of Raden, and the Ritterschaft of the Grand Duchy provide a subvention of 325*l.* per annum. The pupils are compelled to work in the dairy like the paid labourers; they must be at least 18 years of age, and have had some previous experience in dairying. In addition, however, to the resident pupils, there are about twenty-five out-students, or "*hospitanten*," who provide their own board and lodging. These need not perform manual labour, and they can stay for a few days or for some months on payment of very moderate fees. The practical instruction in this dairy is excellent; there are demonstrations, which include the making of whole-milk cheese on the systems of Emmenthal (Gruyère), Tilsit, Gouda, and other districts; also cheese from ewes' milk, and skim-cheese in the Swiss and Tilsit manner. Theoretical instruction is also given daily in a lecture of one hour's duration by the director of the establishment, Professor Fleischmann. Great attention is paid to book-keeping and to the principles of

breeding and feeding, as well as of dairying. Several University students have been found among the number of the "*hospitanten*," who have thus profitably utilised their vacation, but most of the students of this class have been either young farmers, proprietors of dairy establishments, or practical dairymen. Almost every nation in Europe has furnished its contingent, but the majority are Germans. This school is regarded in Germany as by far the best of its kind.

The dairy school of Heinrichsthal, in Saxony, may next be noted as one where young women are trained in the theory and practice of butter and cheesemaking. About ten or twelve students are found here. The farm consists of about 150 acres of arable land, grass, and wood, and 22 Dutch milch cows are kept. Any additional quantity of milk required for the practical demonstrations is purchased at about 5*d.* per gallon. The pupils must be at least 16 years of age, and they pay about 5*l.* for one month's instruction with board and lodging, or 9*l.* for three months. The practical instruction includes technical management of the dairy, book-keeping, feeding, and management of cows, fattening calves and pigs, cooking and management of poultry and of the kitchen garden. The students here are of a somewhat superior class to those ordinarily seen at such schools, being mostly the daughters of proprietor-farmers; whilst others, as *fiancées* of young farmers, have come here to learn everything connected with the management of a farmhouse. These examples must suffice for the dairy schools of Germany; but a list of the dairy schools in the principal localities in the Empire shows: that (1) in the majority of cases they are established for pupils of the female sex; (2) in many cases housekeeping as well as dairying is taught; (3) the regulation course of study varies from one and a half to six months; and (4) the fees from nothing to 30*l.*, though the average may be taken at about 7*l.* 10*s.* for the course.

I am obliged to omit Mr. Jenkins's account of numerous other schools for the teaching of technical subjects; thus we have veterinary, farriery or shoeing, drainage and irrigation, brewing, forestry, gardening, and bee-keeping schools. Many of these are of considerable interest, but want of space induces me to curtail his account.

Versuchstationen.—With a slight notice of *Versuchstationen*, I must conclude this portion of Mr. Jenkins's account of the means adopted in Germany for agricultural education. The Hildesheim station may be taken as a specimen, as it is the principal one in the province of Hanover. Like most of its class, it is really a "Control" station, to which purchasers of manures, feeding-stuffs, seeds, &c., from certain vendors may send samples for analysis and report without charge, the said vendors paying an

annual subscription in proportion to the extent of their business, in order to secure this privilege to their customers. This system is so general in Germany, that vendors who cannot secure this right to their customers have little chance of doing much business. It should be understood that the public laboratory is also available for the analysis of samples sent by other persons at very low fees. No less than 2000 samples of all kinds are sent to Hildesheim "station" in a year; the majority of these are manures, feeding-stuffs, and seeds; but soils and rocks, water, milk, sugar, and sugar-beet, figure among the articles analysed. The number sent to this one station is almost as large as that sent to Hanover Square for analysis and examination by the Chemist and Botanist of the Royal Agricultural Society of England. There are twenty-seven of these *Versuch* or "Control" stations in Prussia, which employ between sixty and seventy skilled agricultural chemists and a considerable number of botanists in the interests of the cultivators of the soil; "whereas in England it would be difficult to enumerate a dozen qualified men who find sufficient encouragement to devote their time to these branches of applied science, except in the interests of the manure manufacturer."

FRANCE.

HIGHER AGRICULTURAL EDUCATION.

The French system of agricultural education contrasts in the main favourably with the German system. It differs from it in one very important respect, namely, that attendance at lectures and in the laboratory is as compulsory in its higher institutes as in the lower schools. Failure to pass a satisfactory examination at the end of each term or year at once severs the pupil from his connection with the school, without any action on the part of anybody, and the pupil cannot be reinstated without a special order of the Minister of Agriculture. The connection of the pupils with even the higher agricultural schools in France is thus eminently real and practical; whereas at the German universities it is too often illusory, or merely theoretical. As in Germany, the right to one year's voluntary service in the army is attached to the entrance certificate of the higher schools and to the final certificate of the lower schools. Compulsory military service is an element which requires to be constantly borne in mind when it is attempted to estimate the adaptability of the French or German systems of agricultural education to our own circumstances.

Mr. Jenkins gives an interesting preliminary sketch of

French agricultural schools as they have existed for the last century, into which it is unnecessary to follow him; but some space must be devoted to the history of the highest school of agriculture in France, namely, the *Institut National Agronomique*. This important institution came into existence in the year 1849, having been established in execution of a law passed by the *Assemblée Nationale*. Its career was a short one; but during the time that it existed it was housed in great magnificence in part of the splendid buildings of the Palace at Versailles. Attached to it were farms several hundred *hectares* in extent, furnished with collections of numerous breeds of horses, cattle, sheep, and pigs. The whole scale of this establishment seems to have been grand and ambitious; among its professors were many first-rate men of science, such as Leonce de Lavergne (Rural Economy), and George Ville (Agricultural Chemistry). The sudden suppression of the institute by a decree of the Prince President in 1852 was a painful blow to agricultural education in France.

In 1876, however, it was re-opened, though with certain important variations from its original constitution. In the first place, it was to be situated in Paris itself; and in the second, in lieu of any practical farm, a small plot of land of 100 acres, at Joinville-le-Pont, was assigned to it, for the purposes of demonstration and experiment. As in all the agricultural academies of Germany, so in the new *Institut National Agronomique* the principle was to be that of a school of sciences applied to agriculture. The school was organised in a part of the building belonging to the *Conservatoire des Arts et Métiers*, in the Rue St. Martin, where it possesses its own class-rooms and laboratories, though on a small scale, whilst it can use the lecture-rooms, the library, and the collections of the *Conservatoire*. This is said to be but a provisional arrangement, and the plan was economical as a commencement; but as the number of students is rapidly increasing, the directors hope soon to have their own building. Students of the Institute must pass an entrance-examination, unless they are Bachelors of Science, or possess the diploma of one of the national schools of agriculture, or have some other qualification which the Board of Examiners deem sufficient guarantee of their educational eligibility. The course of study necessary to enable a student to obtain the diploma extends over two years; but some students, after having obtained their diploma, are allowed to remain a third year, to work in the chemical laboratory and at the experimental farm. The opinion of M. Risler is, that the pupils are overtasked with work during their two years' compulsory study, for it must be borne in mind, that they are bound to employ a

portion of their vacations in studying practical agriculture on farms, nor only so, but that they have to bring back with them a report on the farms visited, and on all the operations which have taken place during their stay.

The programme of the course of studies is far too lengthy to insert here, but it shows that a thoroughly scientific character is given to the teaching. Moreover, it is no mere paper programme, as is too much the case with the German agricultural institutes, but is actually compulsory on the students. Some idea of the discipline may be obtained when it is mentioned that every student is obliged to sign his name in the book on entering, which must be between 8 and 8.25 A.M., and again on returning from *dejeuner* before 11.25 A.M. There are, moreover, roll-calls at unannounced hours during the day, and absence is not tolerated except on account of illness, which must be proved by medical certificate.

The cost of this Institute is necessarily very large. Students only pay 12*l.* per annum for instruction—of course they find their own board, books, and other requirements. At the commencement of the session 1881–82, there were eighty-eight ordinary students, besides seven who were continuing their studies a third year. In the same year the State grant to the *Institut* was no less than 10,778*l.*, and, leaving out of account the fees paid by students, the education of the ninety-five pupils in question entails a cost to the State of fully 100 guineas per head per annum. Every year the students who stand at the head of those who have passed their final examination for the diploma, may receive at the cost of the State a travelling scholarship either in France or foreign countries. This scholarship is tenable for three years, and reports on the subject of his inquiries must be forwarded periodically by each scholar to the Director of the *Institut*. A thousand pounds a year is thus spent in an admirable manner.

Grignon.—If the *Institut Agronomique* is unique among scientific educational establishments, it is owing to the fact of the failure of South Kensington to supply its equivalent in London. The Normal School of Science might, indeed, provide the higher class of agricultural education if it were fully equipped in the same manner as the Paris *Institut*, but however these two institutions may stand in comparison with one another, the next school mentioned, namely, that of Grignon, may fairly be described as the Cirencester of France.

Grignon was established in 1827 under the following circumstances. The estate, consisting of about 1160 acres, was let to a company by the French Government for a period of forty years, and the school was maintained by the company entirely until

1838, when its management was undertaken by the State. Without going into a full history of certain changes which occurred, it will be sufficient to observe, that at the present time a farm of upwards of 700 acres—about half in wood and half under cultivation—is part of the school establishment. The chief object of the farming is to provide for the wants of the College, both material and educational. About 18 milch cows are kept, which have been selected from a large number of breeds, for purposes of study and comparison of their qualities. The sheep number about 500, of which 150 are breeding-ewes; amongst which Merinos, Southdowns, Leicesters, and certain crosses, find a place. A sufficient number of pigs is kept to enable the authorities to kill one every week for the requirements of the establishment; these are mostly either Yorkshire or Berkshire, or crosses of one or other of these with the native race. The Botanic and Economic Gardens are well arranged and stocked, and the students are exercised in all farming operations, so as to enable them to understand the management of the implements, &c.

Here again there is an entrance examination for all candidates who have not taken the degree of Bachelor of Science. The subjects of study do not differ materially from those at Cirencester, and it moreover resembles that institution, in that most of the students are young men of good family and education. Some few have come by virtue of having gained bursaries at the final examinations of the lower schools of agriculture. The average number of students is a hundred, making an entry of about forty each year, the whole course extending over two and a half years.

Every student must be at least 17 years of age. Nearly all are "internals," and the fees paid amount to about 48*l.* per annum for instruction, board, lodging, lighting, fire and washing. Grignon, like the other schools of a similar kind in France, is maintained entirely at the cost of the State. The total expenditure is about 15,600*l.*, and the receipts only 7000*l.* per annum, so that each resident student costs the State practically about 80*l.* per annum.

At the expiration of their studies a diploma is delivered by the Minister of Agriculture to those students who have satisfactorily passed their final examination. This diploma is held in very high esteem among French agriculturists, and constitutes a powerful recommendation in the eyes of proprietors who wish to choose a tenant or a farm manager.

Grand Jouan and Montpellier Schools.—At the two somewhat similar establishments at Grand Jouan and Montpellier the regulations are almost identical with those at Grignon, though

the fees paid are scarcely so large. The discipline at these schools is very strict; any deviation from the rules without previous permission entails expulsion, as also does inability to pass the sessional examinations.

INTERMEDIATE EDUCATION.

Between the *regional* schools, such as Grignon and the farm-schools, the object of which is to educate sons of labourers and small farmers in the practical handiwork of farming, there is in France a class of intermediate schools established on a basis not unlike those already described in Germany. The State pays the salaries of the directors and teaching staff, the Department the equipment of the schools, and the director undertakes to give an approved education, at a very moderate cost, subject to the condition of manual labour on the part of the pupils, who have to work upon the farm a certain number of hours in the day. The admission to these schools is not exactly gratuitous, but the payment is calculated only to represent the bare cost of food and maintenance. Half the time of the pupils is devoted to a somewhat superior primary education, and the other half to work on the farm.

A considerable effort seems to have been made by the Government Department of Agriculture to transform farm schools into practical schools, but without much success, notwithstanding the inducements offered. Mr. Jenkins at his visit, which took place in 1881, only found six of these schools existing, five of which were visited by him. Curiously enough all but one of these schools are situated in the eastern departments of the kingdom, where agriculture is most backward, property excessively subdivided, and methods of culture stereotyped on the old three-field system, and where the cultivators of the soil and their families are as a rule somewhat below the level of ordinary labourers as far as comfort and enjoyment of life are concerned. In such departments as the Pas de Calais, Nord, &c., where agriculture is considerably advanced, none of these schools are to be found. It appears that M. Tisserand, the Councillor of State and Director-General of Agriculture, was formerly employed in the capacity of Inspector-General of Agriculture in the East of France, and that it was his influence which induced the authorities to take up the question and to establish these practical schools.

Les Merchines.—The school of Les Merchines, near Vaubecourt, in the Department of the Meuse, is described by Mr. Jenkins. "Les Merchines is the property of its occupier, M. Millon, and consists of 750 acres of land in a ring fence, a most remarkable phenomenon in a district where a plot of a

quarter of an acre is considered large. Of the total area, 150 acres are in woodland, 50 acres in osiers, 250 in permanent grass, and 300 under arable culture. The farm-buildings are new and excellently designed. Most of the domestic work is done by sisters belonging to a religious body; order and neatness prevail everywhere. Twenty pupils are received and pass through a two years' course of instruction, paying 16*l.* per annum for schooling, board, lodging and laundry. Each class is alternately taught, and works on the farm, and thus the half-time principle is preserved, although in a modified form." The domestic arrangements are simple and well organised.

The subjects of instruction include agriculture and rural economy, the breeding, management and feeding of cattle, superficial and solid measurement and levelling, construction and use of agricultural machinery, and the elements of botany, geology, physics, chemistry, and rural law. The teaching staff consists of eight persons, namely:—(1) the director; (2) farm bailiff; (3) teacher of agriculture and agricultural chemistry; (4) teacher of mathematical, physical, and natural sciences; (5) veterinary surgeon; (6) teacher of French history, geography and book-keeping; (7) the gardener; and (8) the foreman of labour. Candidates must be at least 15 years of age, and they have to pass a thorough examination at the Prefecture; their health and strength are also made the subject of inquiry.

At the end of the first year the students are examined and classified by the committee of supervision, and those who do not pass satisfactorily are summarily dismissed. At the end of the second year the final examination takes place: the student who takes the first place receiving a gold medal and 20*l.*, the second a silver medal and 12*l.*, and the third a bronze medal and 8*l.*; while all who pass satisfactorily, and who have obtained an average number of marks during their two years' sojourn at the school, receive a certificate of capacity, which entitles them to one year's voluntary service in the army without undergoing any further educational examination.

Saint Remy.—At the school of Saint Remy, in Haute Saone, a farm of 375 acres of land is attached. All pupils are treated alike as regards instruction and work for the two years over which the course extends; but differences are made in the dormitory and refectory arrangements, according to the payments made by the students. Those who require only ordinary fare and accommodation, only pay 1*l.* per month; while a second class of students, whose diet is somewhat superior, and who have not to do the work of making their own beds, cleaning their own boots, &c., pay double this amount. There is again a third class of students who, indulging in the luxury of separate bedrooms, pay 4*l.* per month. The general course of instruc-

tion is almost precisely similar to that of Les Merchaines, and prizes to a similar amount are given to the successful students at the final examination.

The cost of these schools to the State was not ascertained exactly by Mr. Jenkins, owing to the fact that the vote for the whole of them was made in one sum, including a number of farm schools. It appears, however, that about 31*l.* per head per annum is required as a subsidy from the State.

LOWER EDUCATION.

The original establishment of farm schools in France dates from 1848; since then the rules and regulations do not seem to have been altered in any fundamental respect. These schools are of interest, as the means whereby a certain number of labourers' and very small farmers' sons not only receive a fair amount of scientific and general instruction, but are also trained in farm work entirely free of cost. The pupils are in fact apprentices, being bound to serve with the directors of the schools for two or three years. The number of apprentices at each school is fixed by the Ministerial order, which makes the school an educational establishment under the Government. This number varies according to the extent of the farm and the nature of the agriculture; in pastoral districts there must not be more than one apprentice to twelve or fifteen acres, but in corn districts one apprentice to every eight acres can be received. There is a rule, however, as to the total number of apprentices, which must be at the least twenty-four, as otherwise the proportional expense to the State would be too great.

The number of apprentices must be limited according to the area of the farm, so that there is always sufficient farm work for them, and it is desired that they should be sufficiently numerous to avoid the employment of any other labour. The apprentices are bound to work in the same way as paid labourers. They cannot be received until they have completed their sixteenth year, and during their stay of two or three years at the farm they cost their parents, as has been before mentioned, absolutely nothing.

Cost of these Schools.—The following is the allowance made by the State towards these schools. In the first place 270 francs (10*l.* 16*s.*) are granted towards the keep of each apprentice, and the following sums towards the salaries of the director and staff:—

- Director, 96*l.* per annum.
- One inspector-accountant, 40*l.*–60*l.*
- One gardener-nurseryman, 40*l.*–60*l.*
- One farm bailiff, 40*l.*–48*l.*
- One veterinary surgeon, 20*l.*–32*l.*

The responsibilities of the director are very considerable. His duties are described in the Appendix to Mr. Jenkins's Report, and he is entirely under the Ministry of Agriculture. At the same time he is absolute master of the establishment, having the power of discharging and appointing the members of his staff, although their salaries are paid by the State. He is under certain obligations to the Government with regard to the school accounts, and must send a statement of the results of his farming operations, accompanied by the annual inventory, at a given date, to the Minister of Agriculture.

Staff.—The duties of the staff are as follows:—(1.) The inspector-accountant must teach the apprentices a simple form of book-keeping, and must complete their elementary education as regards land surveying, cubic measurement, and levelling. He also has the superintendence of the dormitory, refectory, and other arrangements. (2.) The gardener-nurseryman must give the apprentices a knowledge of kitchen and market-gardening, particularly in pruning and grafting. (3.) The farm bailiff must teach them the use of the several implements and machines on the farm, and take general direction of their work. These three members of the staff must be resident on the farm. (4.) The veterinary surgeon has under his care the animals of the farm, and gives the apprentices demonstrations of simple operations, and teaches them how to give the necessary relief in cases of sickness.

The Inspector-General of Agriculture is enjoined to keep a watchful eye upon the general management of the farm and school, and to report to the Minister from time to time his views on the subject.

La Pilletière.—It will be sufficient, I think, to give some account of one of these schools, namely, that of La Pilletière, about halfway between Le Mans and Tours. The farm consists of 280 acres in pasture, clover, lucerne and a small quantity in vines. It is in a picturesque country of hill and dale, with meadows in the valleys, vineyards and pasture lands on the slopes, and a sufficient quantity of arable land to form ample means of instruction in a wide range of agricultural subjects. Four Charolais oxen and four horses are worked; but the cattle stock consists of 40 Shorthorn cows, all the calves of which are reared, the best females being retained in the herd, and the remainder fattened for the butcher. The sheep stock comprises 150 head, and the breeding flock 60 cross Leicester-Merino ewes. The pigs are principally of native breeds, with an infusion of the Large Yorkshire blood.

The course of instruction extends over three years. The apprentices are mostly the sons of small proprietors and tenants

in the neighbourhood. They take the different kinds of farm work in rotation. Thus three are employed in the cattle-sheds for a month, others in preparing the cattle food, and so on.

I am tempted to give, *verbatim*, part of a communication from the director of this school upon the general subject of this farm education. He says: "Notwithstanding all the advantages given by the Government to the young men who become apprentices at the farm schools, the sons of farmers cannot be induced to pass two or three years at one of them. For my part I find the greatest difficulty in obtaining ten new apprentices per annum. The rich farmers have too much pride to cause their sons to be educated gratuitously, besides which the practical schools of agriculture and the *regional* schools are expressly designed for this class of pupils." He then directs his remarks to the responsibilities of the director. "Instead of these having been chosen from the class of proprietors rich and honourable enough to content themselves with an insignificant profit, the selection has too frequently been made of farmers without means, who have traded upon the labour of their apprentices without occupying themselves much with their instruction. A man must be exceedingly conscientious to sacrifice his interests to those of his apprentices; to suspend sowing, cultivating and harvesting; to watch the rain fall upon his half-made hay; to see his beet-roots becoming choked with weeds, and so forth, while the apprentices are tranquilly seated in the school-room receiving instruction in orthography. The worst feature of all is that nobody praises him for his disinterestedness, and many even blame him under the pretext that a farm cultivated at a loss is a bad example for the pupils (!). At La Pilletière I spend 1s. 7d. per day in the maintenance and instruction of each apprentice, and I receive exactly one half as a subvention. The work of the students thus costs one 9½d. per day each, which is double what it is worth. I lose at least 200l. per annum through placing my animals and farm equipment in the hands of inexperienced lads of 16 years of age." It is curious that although M. de Villepin gives such a pessimist account as this, his replies to questions on the influence of the schools are encouraging. He says that many of the apprentices become either farmers themselves, or bailiffs or foremen on large farms, while the best of them sometimes obtain the position of Departmental Professor of Agriculture. He moreover states that he has tripled his wheat-production in twenty years, and that the influence of his school upon the live-stock of the district has distinctly showed itself in the improvement of their character.

Another director, M. du Miral, the manager of a farm-school

at Villeneuve (La Creuse) confirms M. de Villepin's statements with regard to the worthlessness of the services of the apprentices. These services, he affirms, are insufficient to cover the cost of their keep, and, notwithstanding the Government subventions, it is difficult to obtain any profit from the farm-school, because the work done by the pupils is so defective. They break the implements, lame the animals, and altogether do so much damage that their labour costs more than that of paid workmen. But this gentleman also claims for his school a general improvement in the agriculture of the district in which it is situated. Indeed all the directors whom Mr. Jenkins quotes are of this opinion, and all maintain that the State subsidy is insufficient. Most of them admit that the difficulty of obtaining pupils is becoming greater and greater year by year in this class of schools.

SPECIAL SCHOOLS.

Forestry, Nancy.—This school for the education of young men for the State administration of the forests, is also of considerable interest to Englishmen, in consequence of the training which British students also enjoy there for Indian forestry. Only Government pupils are admitted, and those by a stiff competitive examination, with the exception of two pupils of the *Institut Agronomique* in each year. The latter must be Bachelors of Science, and have passed the final examination of the Institute with credit. Candidates for admission must be at least 18 years of age, and not more than 22. The entrance examination extends over three days, the subjects being mathematics, (including geometry, algebra, trigonometry and logarithms), physics, chemistry (organic and inorganic), mechanics, history, geography, German, French, and drawing. The fees are considerable. A sum of 42*l.* must first be provided to purchase uniform, bedding, scientific instruments, &c.; then an annual sum of 60*l.* is required towards the cost of board, lodging, light, firing, laundry, service, books, practical instruction, riding-lessons, &c.; and a sum of not more 24*l.* per annum as pocket-money; a fee of 1 per cent. towards the expenses of administration, and finally a sum of 24*l.* per annum after the expiration of two years' course of study, and until such time as he would be employed actively as a *garde général*.

For it must be understood that the students at this school are considered to be serving with the colours during their two years course of instruction. If they do not pass their final examination they have to serve the remainder of the time laid

down by the Statute in the class to which they belong, whilst those who do succeed in obtaining their final certificate, which carries with it the title of *garde général des forêts*, are entitled to payment by the State, and may either be placed in the army as unattached; in the reserve; in the territorial army; or in the auxiliary service.

A *garde-général*, either probationary or of the second or third class, is equivalent in military rank to a sub-lieutenant of the reserve or of the territorial army, whilst one of the first class is of the same rank as a lieutenant of the reserve. It will thus be seen that considerable importance is attached by the Government to the study of forestry at this school. The normal number of students is 60, of whom 30 go out and as many come in every year. A certain number of foreigners are allowed to attend the classes as free students, on proper application through the diplomatic representative of their nation, and many English students have qualified for service in India since the establishment of the College.

The course of instruction during the first year is on economic forestry, political economy, natural history, applied mathematics, including topography, roads, and constructions; German language, military instruction, riding, &c. Many of these subjects are given by oral instruction during the winter term. In the summer term the number of days spent on the land is greatly in excess of those devoted to lectures. The nature of the work at this period consists of tree-planting and forestry excursions, plant-collecting during such excursions, land surveying, topography, and forest constructions and military reconnaissances. During the second year the teaching adopted is of a somewhat higher description, principally upon the same subjects, but agricultural chemistry is also brought into the course.

The other special schools in France, though somewhat varied in character, are scarcely of sufficient general interest to detain us for any length of time. They include some veterinary schools, a rather important school of horticulture at Versailles, established in 1873, and utilising the magnificent gardens formed there by Louis XIV., and which cover about 24 acres of land. This horticultural school costs the State no less than 3000*l.* per annum. There are also establishments for the teaching of drainage and irrigation, shepherding, and dairy work.

DEPARTMENTAL PROFESSORS.

An important institution in the agricultural education of France is that of departmental professors, which, although

of considerable antiquity, has only recently become of much importance.

By the law of 1879 every department not already possessing a professor of agriculture was compelled to elect one by competitive examination under certain Government regulations. The examination has to be upon the general principles of agriculture, of viticulture, of arboriculture, of horticulture, and on the sciences in connection with these arts. The candidates must be of French nationality, and at least twenty-five years of age. The professors must give their lessons at the normal primary schools and at such other public institutions as exist, and they also have to deliver lectures in the different *Communes* to the teachers and agriculturists of the district.

The salaries of the professors of agriculture are paid by the State, and the travelling expenses by their own department. Their salaries are fixed on the following scale: Fourth class, 120*l.*; third class, 140*l.*; second class, 160*l.*; and first class, 180*l.* On appointment, every professor enters the fourth class, and no promotion to a superior class can take place without three years' service at least. Such promotion is decided upon by the two Ministers (of Agriculture and Commerce and of Public Instruction and Fine Arts). The agricultural lectures have to be delivered according to a programme decided upon each year by the Minister of Agriculture and Commerce. Not less than twenty-six are to be delivered in a year, the localities in which they take place being decided on by the Prefect.

In one of the letters of instruction to the professors, they are reminded by the Minister that their "mission is to keep the cultivators of the soil informed respecting modern discoveries and new inventions of economical and advantageous application, so as to let them be ignorant of nothing which it is to their advantage to know, but to lead them forward in the general movement of progress in which they participate to so small an extent owing to their isolation." The following remarkably sensible advice is also given:—"I should recommend you to use great prudence with respect to questions of theory, or rather of principle which you may be tempted to broach. In addressing cultivators and practical men, who have the knowledge for themselves which tradition gives,—that is to say, the slow and patient observation of facts from generation to generation, you should dwell only upon well-known truths and principles clearly proved by science. Your language should be clear, simple, and denuded of all expressions which will not be thoroughly comprehensible to your audience. You should not forget, in point of fact, that as lecturer your

province is to be a promulgator of progress which does not exclude in any way either elevation of thought and elegance of diction."

In the general scheme issued by Government as to the duties of professors, a very long programme is included. The professor is not only informed what subjects he should take for his introductory lectures, but the whole two years' course is mapped out for him in considerable detail. The first year is to be devoted principally to the soil, and the means of modifying its composition and physical properties; to the nature, qualities, and uses of manures; to drainage, tillage, and cultivation; and, secondly, under the singular head of "*Phytotechny*," to the cultivation of such special crops as the department produces. Moreover, forestry and the constitution of the law of property are included in this course.

In the second year the animal kingdom, or general and special "*zootechny*," must receive his attention, particular regard being had to the following points: (1) growth and preparation of foods; (2) production of milk; (3) production of fat; (4) production of power; (5) production of manure; (6) housing of animals; (7) the principles of reproduction, breeding, &c.; and, lastly, the different animals of the farm are considered separately, and their hygiene also receives attention.

AGRICULTURAL EDUCATION IN ELEMENTARY SCHOOLS.

It would be improper to pass over entirely the very interesting attempt which has been lately made in France to bring agricultural instruction within the reach of children in elementary schools. Primary instruction in France is designed for boys and girls from 7 to 13 years of age, and is divided into three sections—physical, intellectual, and moral. Such agricultural education as is imparted to children is given them entirely under the second of these heads. The teaching in the boys' and girls' schools is necessarily dissimilar; whilst the former are taught about soils, manures, crops, plants, machines, cattle, and farm products (*e.g.* milk, cream, cheese, cider, perry, &c.), the girls are instructed in the employments and occupations specially within the province of a woman in a farm-house. Such matters as baking; the management of the dairy in all its details; the feeding, milking, fattening, and even common diseases of cattle, management of pigs and poultry (special attention being paid to the latter); and, finally, the uses of the kitchen-garden, together with the cultivation of the best kinds of vegetables and fruits for domestic purposes.

Rewards are given to the teachers in these schools by the "*Société des Agriculteurs de France*," in the shape of gold, silver, and bronze medals.

"This department of the French system of agricultural education is especially interesting, because it is (1) the only example which I shall be able to indicate of an attempt in foreign countries to give technical instruction in matters pertaining to the cultivation of the soil to the lowest stratum of those who depend upon that industry for their livelihood; and (2) because its essential element differs completely from that which has been laid down by our Education Department in the Minute of 1883. The basis of the French system is *facts*, whereas our new departure is built on *principles*. In one respect the two attempts at primary agricultural instruction have a common ground-work, that both are encouraged by the offer of rewards to the teachers instead of to the pupils.

"It seems to me that the true principle of granting rewards for efficiency is to give them directly to the pupils, not only immediately by means of prizes, but also prospectively through the agencies of scholarships or bursaries, certificates of efficiency, and any other means that may be devised to improve the future of the successful pupils. Payment by results to the teachers as a means of encouragement to technical instruction, when the only test is a written examination, is only too likely to end in the acquisition by the pupil of a knowledge of a technical jargon, without any idea of its practical meaning or utility."

It must be confessed that in this matter of early teaching of agriculture, at least, our neighbours are distinctly before us. An earnest attempt is being made to bring home to the minds of the youngest of country children some knowledge of rural affairs; and if the somewhat ambitious programme issued by the "*Comice Agricole*" of the Rouen district, and quoted by Mr. Jenkins in his Appendix (pp. 356 and 359), is not fully carried out, we can scarcely doubt that in the hands of persevering teachers much useful knowledge is being imparted, which will surely bear its fruit in the future.

The *Stations Agronomiques*, or Government laboratories, as it would be better to call them, differ so little in their objects and uses from those already alluded to in Germany, that it is unnecessary to do more than refer to their cost to the State. There are twenty-three such stations in France, and the Government grant shows that about 150*l.* per annum is advanced to each of them by the Agricultural Department.

DENMARK.

Those who have studied Mr. Jenkins's Report on the Agriculture of Denmark, made for the Royal Commission on Agriculture, will be prepared to find that this small country, with something short of two million inhabitants, has by no means neglected the advancement of agricultural education, and indeed no less than 11,000*l.* are annually devoted to this object by the State.

The first system which has to be noticed is that of agricultural apprenticeships, which exists in connection with the Royal Agricultural Society of Denmark, an institution entirely unlike our own national Society, inasmuch as it is managed altogether by the State. Prof. Jorgensen, Principal of the Copenhagen College, thus states the objects of this system, if such it may be called. The apprentice who wishes to be placed on a farm must be at least 18 years of age, and must address to the Society a request written entirely with his own hand, and enclosing a certificate of good conduct, that he possesses the requisite elementary knowledge, that he is strong, has good health, and is accustomed to the ordinary manual labour of a farm. The Society then assigns him a place on a farm, and afterwards changes him to another, so that he may be able to acquire a knowledge of different systems of agriculture. The apprentices never remain more than one year on the same farm, and they are placed alternately on the islands and in Jutland. The Society provides each apprentice with a small collection of books treating of natural history, agriculture and stock management. The farmers where they are placed give them any necessary explanations on matters which they do not understand. At the end of their term the books become the property of the apprentices; but if they do not serve their whole term, they are bound to return them to the Society. Each apprentice must keep a diary of what takes place on the farm, and write a report on it. This report is submitted to an examiner, and his opinion on it is published in the annual statement issued by the Society.

This system has been highly successful; the payment made to the apprentices by farmers is very small, only 4*l.* 10*s.* to 6*l.* each, yearly; but the great demand for their services has led the Society to be very careful that they are sent only to good men, and that in this way their agricultural education is cared for and improved. The certificate received by the apprentices at the end of their term of service being given directly, as it were, by the State, is highly prized, and often leads to the acquisition on the part of the holder of a situation as bailiff or dairyman (or dairywoman as the case may be), from which he has the opportunity of rising to a more responsible post.

But these advantages do not end here; there are afterwards three grades of theoretical study open to the enterprising young man who is anxious to improve himself. He can receive (1) a course of 5 or 6 months' instruction at one of the agricultural schools attached to some of the primary schools (*Folkeskoler*); (2) a more complete course of 9 or 10 months at other specially devoted to this kind of instruction (*Landboskoler*); (3) a course of either 21 or 27 months at the Royal Agricultural College at Copenhagen. It will thus be seen that the essential principle of the Danish system is the complete separation of practical from theoretical instruction. As a matter of fact, "farm schools" and "practical schools of agriculture," in the sense in which those terms are used in France, have never succeeded in Denmark.

The information given about primary schools (*Folkeskoler*) is too vague for me to devote any space to it. These schools seem on about the same footing as our own primary country schools, and the complaints of the teachers are that, owing to the children being frequently employed in agriculture, they often leave the schools very deficient in theoretical knowledge.

Agricultural Schools.—At the agricultural schools the pupils, who are mostly the sons of well-to-do farmers, pay something less than 2*l.* per month for board, lodging and instruction. The Government assists these schools with a subvention, but in other respects they are private institutions. Practical schools have been such entire failures, that only one farm-school now exists in the kingdom.

Theoretical Schools.—The theoretical schools, however, are characteristic of the country. Information regarding one of them, that of Odense, is given in the Report. This school was founded in 1855 by a society which simply styled itself "The Patriotic Society." The object of the school is to continue the education of young men who intend to become farmers. Each class is of six months' duration, namely, from October 1st to March 31st, and in the summer the pupils are either sent to farms to continue their instruction in practical agriculture, or return to their own homes. In the first session their studies are partly of a general educational character and partly technical, but during the second session entirely technical. Those who pass satisfactorily at the end of the second session receive their final certificate, and after leaving the school most of the pupils complete their practical education on well-known farms. The plan of studies comprises almost all the subjects taught in the higher German schools, with the exception of foreign languages. The fees paid by the students are about 4*l.* 10*s.* for the first session, and nearly 4*l.* for the second. About 60 or 70 pupils have generally been on the books at one time.

Landboskoler.—At one of the *Landboskoler* which was established in 1873 education is given to girls. Special instruction in dairying by lectures and by practical work, both as regards milking and dairy management, is here given. The girls are divided into two classes; and while one receives instruction in dairy work, the other is being taught dairy account-keeping, writing, and female handiwork generally. The cost here is not quite 2*l.* per month for board, lodging, light and firing.

The subventions to the two last-mentioned schools are insignificant, and Mr. Jenkins remarks that it is marvellous how with such small fees the last one pays its way at all.

THE ROYAL VETERINARY AND AGRICULTURAL COLLEGE.

Without doubt the most important agricultural institution in Denmark is the Government establishment of the Royal Veterinary and Agricultural College. It provides the highest course of theoretical instruction in veterinary science, agriculture, estate management, horticulture, forestry, &c. There are no less than twenty-two professors and lecturers, headed by the eminent director Professor Jorgensen. The College buildings contain class-rooms, museums, laboratories, &c., such as one expects in an establishment of the kind, and the subjects taught are anatomy and physiology, pathology and therapeutics, chemistry and pharmacy, agriculture, veterinary medicine, land surveying and levelling, botany, forestry, physics and meteorology, veterinary surgery and clinics, dairying, book-keeping, agricultural engineering, general zoology, veterinary police, land laws, mathematics, shoeing, gardening, geology, and pharmaceutical practice.

Nearly 300 students were being educated in this College in 1880, of which 122 were veterinary, and 76 agricultural. The remainder were studying land-agency, forestry, horticulture, and miscellaneous subjects.

The students provide their own board and lodgings, according to their taste and means, the College providing only instruction. Attendance at the lectures is absolutely free, and all persons may take advantage of them without any obligation to pass examinations or to enrol themselves as students. Some small fees are paid by students on certain occasions, which go to provide bursaries for deserving and necessitous students. The expenses of the College are defrayed entirely by the State, and it costs about 7000*l.* a year, without reckoning the capital expended in buildings, &c.

The students belong to every class of rural society, from the sons of large landowners, who have been educated at private schools, down to the sons of small tenant-farmers, who have

received their education at the village primary schools, and have subsequently learnt practical farming on their father's or on some other farm in the manner already described. Many of these latter are aided in their expenses of living in Copenhagen by the bursaries or scholarships above mentioned. It is a noteworthy feature that under this organisation the son of a large landowner of the highest rank may sit in the class-room next to the son of a small peasant-farmer, and will be on good terms with him; whereas once outside the College walls the former mixes in the best society in Copenhagen, and the latter retires to his humble attic. The proportion of the farmer class of students to the whole has increased from about $6\frac{1}{2}$ per cent. at the first establishment of the College, to 30, 40, and even 50 per cent. of late.

The greatest encouragement seems to be therefore given to the hard-working or clever sons of the peasant-farmer, and it is evident that these facilities are being taken advantage of in an increasing degree. An interesting history of a student was given to Mr. Jenkins by Professor Segelcke. This young man was the son of a Jutland farmer, holding only 25 acres of land. He was one of four children, the eldest of whom, having qualified herself as a governess, is earning her living in this capacity. The young man in question was educated at the national school of his father's village until he was 14 years of age, after which he worked on a farm in the neighbourhood as an ordinary indoor labourer until he was 20. The money which he saved during this period he afterwards spent in acquiring a better education at one of the higher schools. The next year was occupied in serving his time as a soldier, which is compulsory in Denmark to young men of all ranks. His next step was to obtain employment as a farm labourer on a farm belonging to an agricultural school (*landboskoler*), receiving instruction in the theory of agriculture instead of wages. He was now enabled to obtain complete instruction at the same school, partly by means of a Government grant, which was awarded to him in recognition of his exertions, and partly by making himself generally useful in the school and on the farm. Having then obtained a recommendation to the Royal Veterinary and Agricultural College, the question to be solved was how to defray the expense which the acceptance of this nomination would entail. The total cost of the course of two years at Copenhagen could not be estimated at less than 70*l.*, of which about 20*l.* would be covered by the Government grant. He succeeded in borrowing 12*l.* from a relative, his father undertaking to pay the balance. He left the College with the highest certificates and testimonials, and was thus

enabled to procure a situation as bailiff upon a large farm at a good salary. Professor Segelcke said that this was not an unusual case of perseverance and industry.

PRACTICAL INSTRUCTION IN DAIRYING.

Many large dairy farms in Denmark are practical schools for dairying for farmers' daughters. The young women remain on the farm for one or two years, and do all but the heaviest work of the dairy in exchange for instruction, board, and lodging, and sometimes a small payment of about 2*l.* or 3*l.* per annum. There are not generally more than three or four pupils in the dairy at one time; but on the farm of Mrs. Hannah Nielson, consisting of about 170 acres, there are often about a dozen farmers' daughters employed as working pupils, who are boarded and lodged in the farm-house for various periods extending from six weeks to two years. The usual length of stay is six months, and they are mostly peasant-farmers' daughters. Each pupil has five cows allotted to her in rotation, and the result of the several milkings are carefully noted, the produce of each cow being entered separately morning and evening, together with the name of the milker. The knowledge that the results of their milking are booked produces a spirit of emulation amongst the girls, which gives far better results than any system of supervision.

On some of the large farms, where the head of a dairy is a man, the pupils are also men.

To sum up, the results of agricultural education in Denmark have been something extraordinary. Twenty years ago the butter sold in the market by the yeomen farmers was pronounced execrably bad; at present, Danish butter in its season has practically no rival on the London market.

BELGIUM AND THE NETHERLANDS.

In these countries agricultural education, although it has received some attention, has by no means attained the importance which has been given to it by the other Continental States already mentioned. At Gembloux, in the former country, and at Wageningen, in Holland, State agricultural institutes have been established, but these are the only high schools of any considerable importance in the two countries.

Gembloux is situated in the central and loamy district of Belgium, where sugar-beet farming is most productive. The farm belonging to the Institute, which extends over 165 acres, is therefore cropped on the system most applicable to that

description of agriculture. The course of cropping extends over six years, namely, (1) sugar-beets, (2) wheat and clover, (3) clover, (4) wheat, (5) sugar-beets, (6) wheat. With the exception, therefore, of straw and beet-root pulp, which seem to be consumed upon the farm, the produce of five-sixths of the land is annually sold off. The highest system of farming has thus to be adopted to maintain the productiveness of the soil; and as the farm is cultivated with a view to profit more than for experimental purposes, the greatest care must be taken in the purchase of fertilising ingredients and in the sales of produce in order to achieve such a result. The farm is debited with a rent of 57*s.* 6*d.* per acre (180 francs per hectare).

The course of instruction extends over three years, and students who pass their final examination receive the diploma of "Agricultural Engineer." As this diploma is made by the State a necessary qualification for persons desirous of being employed in the forestry, drainage, and irrigation of the country, it should be much sought after; but with a total number of students averaging 70 for the last three years in which returns have been made, only 40 have attempted to pass this examination, and only 26 have succeeded in obtaining it. Students may be either resident or non-resident. The former pay 28*l.* per annum, if Belgians, and 40*l.* per annum, if foreigners; the latter pay 12*l.* per annum, if Belgians, and 16*l.*, if foreigners. Candidates for admission must be 16 years of age, and must pass an entrance examination, in case they have not taken some academic degree; practical instruction takes a large place in the teaching, although if the programme of theoretical instruction is carried out, the College in that respect resembles many of the higher schools already described. It is unlike most of them, however, in this particular, that the students of the third year are required to participate in the daily work of the farm, and to take notes thereon. The cost of this Institute to the State is about 60*l.* per head per annum. It is interesting to learn that an average profit has been made upon the farm of 300*l.* per annum, at least such was the case up till 1879.

There is a school of veterinary medicine at Cureghena; there are practical schools of horticulture at Vilvorde and at Ghent; and there is a superior school of agriculture at Louvain, which, however, owes its origin to the Catholic University there. Religious teaching here forms part of the curriculum.

Numerous agricultural stations have been founded in different parts of the country, and that of Gembloux seems to have been fully as successful as our own in Hanover Square.

Wageningen.—The school of Wageningen is situated close

to the Rhine in the Dutch province of Gelderland. It has a small farm in connection with it, about 18 acres, 8 grass and 10 arable, and very ample farm-buildings and appliances. It seems to cost the State about 27*l.* per annum per pupil. It is divided into (1) High School, which may be regarded as equivalent to the German *Realschule*; (2) a lower agricultural school; (3) a higher agricultural school; (4) an experimental and analytical station. The plan of studies in the High School (general education) is rather remarkable as including four modern languages, viz. Dutch, French, English and German. The lower agricultural school takes stock-breeding, dairying, agricultural machinery, farm management, manuring, &c.; and the higher agricultural school, the higher sciences connected with that art with other branches of agricultural teaching.

Although the farm is so small, instruction of every kind is abundant, and admirably arranged specimens of the best breeds of farm-stock and of the best description of agricultural implements are to be found upon it. A 6-horse power engine enables the stationary machines to be shown at work, either separately or together.

The school fee for out-students is 3*l.* 6*s.* 8*d.* per annum, with 50*s.* for books. Boarders pay in addition 37*l.* 10*s.* per annum. The students are very mixed, as in Copenhagen, some being the sons of peasants, others of merchants, and a small proportion are sons of landowners.

There is a State veterinary school at Utrecht, and the agricultural station in connection with the school at Wageningen has prospered largely. The main feature in the work of this station is the remarkably large number of samples of seeds and soils sent for examination.

There is scarcely any agricultural instruction in the primary schools of this country.

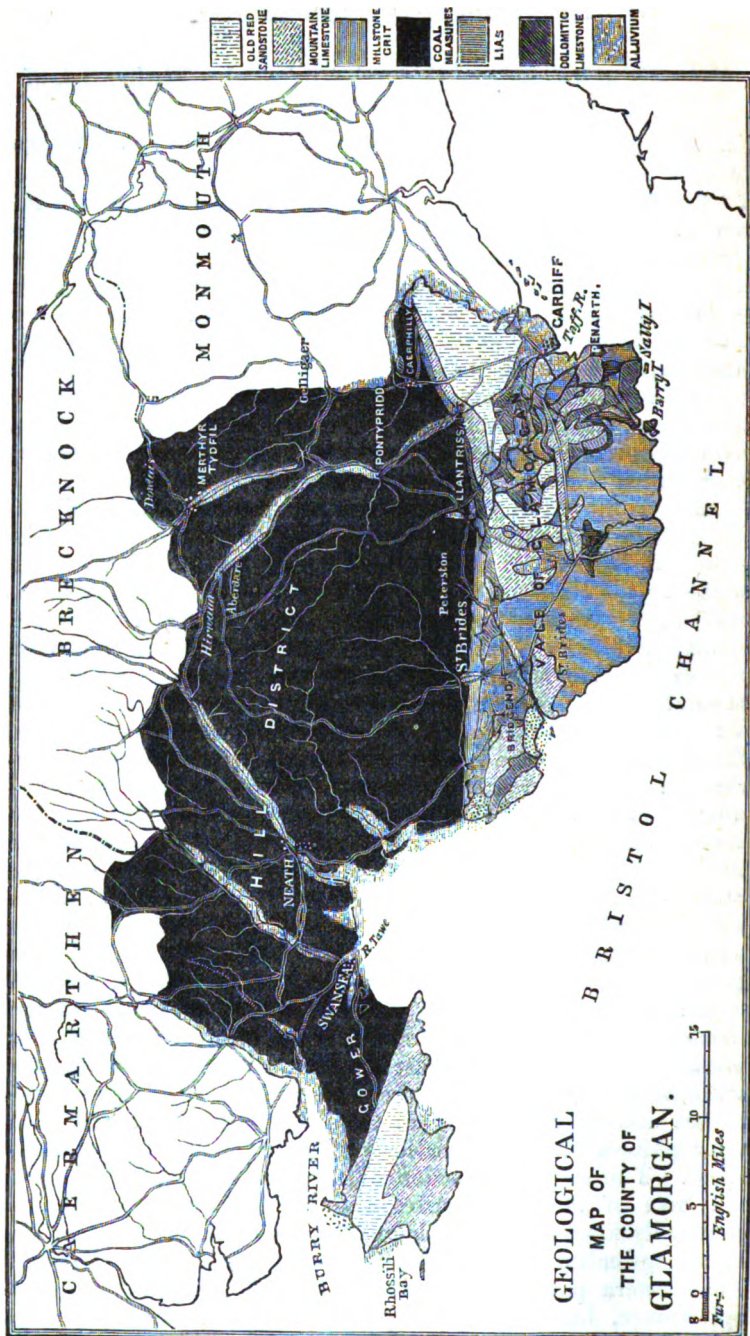
The consideration of that part of the subject which relates to Great Britain and Ireland must necessarily be deferred until the next issue of the 'Journal,' space not being sufficient in the present number for its insertion. Such a review, together with a notice of the conclusions and recommendations of the Commissioners, will finish this survey of the subject.

VI.—*The Agriculture of Glamorganshire.* By W. LITTLE, of Aberaman, near Aberdare.

[PRIZE ESSAY, in competition for a prize of 25*l.* offered by Lieut.-Col. Picton Turbervill.]

THE county of Glamorgan is more noted for its great mineral wealth than for its agricultural products; for, containing the largest area of the South Wales coal-field, it is at once the most important commercial county in the Principality, the most populous, and the most wealthy. Where Nature has stored up mineral riches in the bowels of the earth, the surface is generally infertile, and a very large area of this county is no exception to this general rule, but a prominent example of it. Notwithstanding this, the agriculture of Glamorgan, though not standing forth with any great prominence, possesses many features of interest, from which some profitable deductions may be adduced.

The county of Glamorgan is situated between 51° 23' and 51° 48' north latitude, and between 3° 3' and 4° 18' west longitude. It is bounded on the east by Monmouthshire, on the south by the Bristol Channel, on the west by Carmarthenshire, and on the north by Brecknockshire. Being a maritime county, it affords great facilities at its ports and harbours for the exportation of its mineral products. The coast-line is semicircular, its convex part being towards the Channel. The north and north-east parts of the county are mountainous, though none of the mountain ranges attain to great elevations. The highest mountain is Garn-fach, to the south-west of Hirwain, which is 1971 feet above the sea-level. The average height of the mountain ranges may be estimated at 900 feet above the level of the sea. The whole surface of the county has a general slope or declination from north to south. Though the mountain scenery is subdued in tone, it is in many parts beautiful and varied. The ranges of high hills are generally intersected by comparatively narrow valleys, through which the mountain streams and rivers wind their way to the Bristol Channel. The sides of the valleys are in many instances picturesquely wooded, at least for some distance up, whilst the summits of the mountains are bare and rugged. The farm-houses are chiefly planted on the sloping hillsides, and with their white-washed exterior lend a pleasing feature to the landscape. The southern portion of the county, situated between the base of the hill district and the Bristol Channel, and commonly known as the Vale of Glamorgan, is level and fertile. In an agricultural sense, this is the most important division. The western portion, viz. Gower, is hilly and undulating in appearance, but the highest portions of it do not rise to the height of mountains.



Geological Features.—The older geological formations are the Silurian, the Old Red Sandstone, the Mountain Limestone, the Millstone-grit, and the Coal-measures; whilst the newer formations are the Permian, the Trias, the Keuper, the Rhætic beds, the Lower Lias, and the Alluvium. The whole of these formations crop up in a greater or less degree throughout the county, and become the base on which the surface soil rests. The Silurian formation is met with on the eastern boundary near Cardiff. The Old Red Sandstone appears in patches to the north-east of Cardiff and in the neighbourhood of Bridgend, and it also forms a strip across the whole of Gower. The Mountain Limestone and Millstone-grit form respectively the outer and the inner ring encircling the whole of the Coal-measures. The extent of the coalfield carries these two formations beyond the boundary of the county on the west, north, and east, excepting a comparatively small area at Dowlais on the north-east corner of the county, where the Mountain Limestone is worked and used for fluxing the iron ore in the furnaces. The Coal-measures occupy fully two-thirds of the whole area of the county, viz. the hill districts to the north and north-west. The Permian formation is met with in the neighbourhood of Llantrissant. The Trias appears at Radyr near Cardiff. The Keuper is found on the coast at Penarth. The Rhætic beds are also met with on the shore-line near Penarth. The Lower Lias extends over the greater portion of the Vale of Glamorgan. Alluvial deposits chiefly exist near the mouths of the various rivers, and in some parts of the valleys through which they flow. The principal alluvial deposits are the East and West Moors, near Cardiff; the valley of the river Ely, near Peterston; the Sully and the Flemingstone Moors; and the Penllyn Moors, near Cowbridge. The term “moors” is associated in most men’s mind with “heather,” but the marshy grass lands of this and the adjoining county of Monmouth are known by this name.

Whilst the Coal-measures occupy the first place in the county, as far as area is concerned, the Lower Lias is second in this respect, and the Mountain Limestone comes next. The other formations occupy only small areas, and are, in a manner, of more importance to the geologist than the agriculturist. The Lias and the Mountain Limestone formations are frequently contorted, and disturbed in their conformability, and interspersions of patches of other rocks are common. The quality of the surface soil varies very much, in consequence of the disturbed state of the strata. The surface deposits frequently differ so materially from the subjacent rocks, owing to denudation and other causes, that the formation on which they rest bears little or no relation to them.

Soils.—Geology, though interesting as a study, and of great importance to the agriculturist, is frequently made only a secondary help in the classification of soils. In practice, agriculturists commonly classify them as heavy, medium, and light. The classification is a rough and ready one, and by no means sufficiently defined to be universally applied. Reviewed, however, by this standard, there is a considerable area of heavy clay-land in the Vale of Glamorgan, principally in the parishes of Wenvoe, Llancarvan, Llansannor, Monk-nash, and others. There is a much larger area of medium land in the southern part of the county, heavy enough to grow wheat well, but not too strong in texture for the profitable growth of roots. This class of land is found in the districts of Cowbridge and Bridgend. The lighter soils extend to the south-west of Bridgend and throughout the cultivated portions of Gower, and also the cultivated portions of the hill districts of the county. In short, the lighter soils may be said to embrace the whole of the Coal-measures and the peninsula of Gower, the classification being specially applicable to the mountain tops in a double sense, inasmuch as a very light covering of any kind generally exists. The hill or mountain tops are frequently capped with large boulders and other débris of the Pennant sandstone rocks, interspersed with patches of peat and other marshy ground. Their aspect is "brown and russet bare," and seldom green excepting when covered with ferns. The grassy slopes of the valleys and the meadows at the bottom are enriched by the pluvial washings of the mountain tops.

Area.—The area of the county is given in the Agricultural Statistics of Great Britain as 547,070 statute acres. In the Census Returns of 1881 the acreage is given as 516,959 statute acres; but this evidently does not include the area of the towns, railways, and other works. The population in 1881 was 511,433 persons, which, according to the latter acreage, is 1.01 acres to each person. The agricultural population, not including woodmen and gardeners, was 9717, whilst the mining population was 45,854 persons. The population seems to have increased slowly from 1801 to 1831, whilst from the latter date to 1841 the increase was at the rate of 35 per cent. The increase of population has been contemporaneous with the development of the mineral resources of the county. Previous to 1798 the county seems to have been occasionally an exporter of corn and other produce to Bristol and elsewhere. Its whole produce, both agricultural and mineral, especially from the hill districts, would appear to have been about this period conveyed to the markets or ports on mules' and horses' backs. In 1798 the Glamorganshire Canal was opened between Cardiff and Merthyr Tydfil. In 1839 the Marquis of Bute completed the West

Bute Dock at Cardiff, and in 1841 the Taff Vale Railway was opened; whilst about the same period the port of Swansea was being improved and developed. As a result of the development of the great mineral resources of the county, the population is found to have increased in seventy years, viz. from 1801 to 1871, at the rate of 461 per cent. In 1871 the population was 397,859 persons, whilst the Census of 1881 shows an increase of population during the decade of 28·54 per cent. In 1831 the depressed state of agriculture is referred to as being the means of increasing the town population and reducing that of the rural districts. The value of the Welsh smokeless steam coal was discovered between 1835 and 1840, and in ten years afterwards a number of collieries were opened in the Aberdare and Merthyr valleys. The development of the coal trade has been progressive ever since that period. There are now over 300 collieries in the county, and the quantity of coal raised in 1881 was 15,987,516 tons. These statistics may be considered foreign to the purpose of an agricultural essay, but in my opinion nothing exercises such a powerful influence for good on the agricultural interest of any county as the profitable development of its other great industries. The best markets are thereby opened for every kind of agricultural produce at a nominal expense of transit. The agriculture of Glamorganshire may not have even now much to commend it; but that it has been greatly stimulated by the commercial undertakings of recent years the least observant will scarcely be prepared to dispute.

Elevation.—The general elevation of the hills at the base or south crop of the Coal-measures may be taken as 400 feet, and the mean average of the mountains at from 800 to 900 feet. The mean level of the valleys may be taken as being between 300 and 450 feet above the level of the sea, and the cultivated portions of the hillsides at an average of about 600 feet.

Temperature.—The mean temperature of the county may be put down at 50 degrees. In the Vale of Glamorgan, where some exotic plants thrive in the open air, the temperature would be much higher than 50 degrees, but it would be correspondingly lower in the hill districts. Dr. Franklen Evans, in his Meteorological Report to the Cardiff Naturalists' Society in 1879, gave the mean temperature in that year as 47·6 degrees.

Rainfall and Climate.—The rainfall, though exceeded in some parts of Cumberland, Westmoreland, and Yorkshire, is excessive compared with that of the English counties generally. According to Mr. Symons's Tables, the mean rainfall of Glamorganshire in 1882 was 74·90 inches, whilst the average rainfall of the county of Middlesex was 29·08 inches, and that

of the county of Leicester 37·56 inches. The mean average rainfall in 1883 was in Glamorgan, 56·08 inches ; in Middlesex, 25·64 inches ; and in Leicester, 33·13 inches. The rainfall of the hill districts of Glamorgan exceeds that of the Vale or lower districts by 20 inches per annum on the average. I cannot do better than give some notes from Dr. Franklen Evans's Reports just referred to, respecting the meteorological character of some of the recent seasons. "In 1872 rain fell on 243 days in the county, the total rainfall being 62·73 inches. In 1875 there were 196 wet days, and the mean rainfall was 63·22 inches. In 1879 the average rainfall was 52·54 inches. The season was marked by a low average temperature. The harvest of this year was worse than that of 1860, and more like that of 1816. In 1880 the average rainfall of the county was 41·80 inches. The mean temperature 50·4 degrees. The mean degree of moisture was 81, complete saturation being represented by 100."

The prevailing winds in South Wales are from the west and south-west, and they expend their force on its mountain ranges. The mountain-tops drain the rain-clouds of their contents, and break the force of the gales in their passage inland. South Wales is noted for its mild, but wet winters, by somewhat late springs, and by variable summers and autumns. The changes of temperature are frequently very sudden. Snow generally melts as it falls near the coast, and even on the mountain-tops it seldom remains for any length of time. The recent seasons, so frequently described as having been abnormally wet, have not always been so in reality, but the rainfall has been peculiarly distributed, and it has fallen at times disastrous to farming pursuits. Although the county of Glamorgan is characterised by great humidity, owing to the mists and vapours which rise from the Atlantic, all cereals, whether grown on the lowlands or in the hill districts, seldom, if ever, fail to come to maturity. The mild and moist climate is particularly favourable to the growth of grass and green crops. It is no uncommon thing for land, after having been cultivated for a number of years, to be allowed to seed itself down to grass. The practice cannot be commended in any way, but doubtless much of the grass-land of Glamorgan has at some period been left to nature to do the seeding. In other parts of the country, where grass has been laid away with the greatest care, it generally shows a falling off in vigour about the fourth and fifth years. In this county, if the treatment has not been bad, grass-land at four or five years old shows no lack of vitality, and generally a fairly good sward has by that time been established.

Agricultural Statistics.—According to the Agricultural Returns of 1873, published by the Board of Trade, the average extent of land returned by each occupier in the county was 50 acres, and the total acreage under all kinds of crops (excluding heath and mountain land, but including bare fallow and grass) was 262,242 acres. There were of—

Corn crops	40,233 acres.
Green crops	16,582 „
Clover, sainfoin, &c.	30,310 „
Permanent pasture	171,344 „
Bare fallow,* &c.	3,773 „

The numbers of live-stock are given, viz.—

Agricultural horses and ponies	12,129
Cattle	50,562
Sheep	298,001
Pigs	15,728

The Agricultural Returns of 1883 give the total acreage of Glamorganshire under crops, bare fallow, and grass as 276,460 acres, viz.—

Corn crops	34,644 acres.
Green crops	15,647 „
Clover, sainfoin, &c.	22,759 „
Permanent pasture	200,113 „
Flax	41 „
Bare fallow, &c.	3,256 „

The numbers of live-stock were, viz.—

Horses (including ponies used solely for purposes of agriculture, &c.)†	6,974	} 15,224
Unbroken horses and mares kept for breeding	8,250	
Cattle of all ages		50,901
Sheep do.		253,296
Pigs		14,359

A comparison of the above figures shows in 10 years a reduction in the area of corn of 5589 acres, of 935 acres of green crops, and of 7551 acres of clover and rotation grasses. The reduced acreage of bare fallow in 10 years is only 517 acres. There is, however, an addition to the permanent pasture of the county during the last 10 years of 28,769 acres, but a large

* The return of bare fallow, &c., is not given, but it may be inferred that it was 3773 acres.

† There will be at least 7000 horses in Glamorgan not included in the Agricultural Returns, being employed chiefly in the coal mines.

portion of this can be accounted for as land re-claimed from the hillsides and laid down to grass. An analysis of the live-stock as given above shows an increase in 10 years of 3095 horses and ponies, but a merely nominal difference in the number of cattle, whilst the decrease in sheep for the same period is no less than 44,704. There is also a decrease of 1369 pigs. The decrease in sheep in 1880, as compared with 1879, was 32,659 head, and for the following three years the number remains almost stationary, showing that the disastrous losses by liver-rot in 1879 have not yet been repaired.

In attempting a description of the farming of Glamorganshire, I propose to take the three natural divisions of the county already indicated, and in the following order, viz. :—

- 1st. The Vale of Glamorgan.
- 2nd. Gower, or West Glamorgan.
- 3rd. The Hill Districts of the County.

THE VALE OF GLAMORGAN.

The area under this heading is estimated at about 141,000 acres, and includes the whole of the flat land south of the Coal-measures. It extends from the river Rumney on the east to the river Afon on the west. The boundary line of the coal-field forms a dividing line between the arable farming of the south and the pastoral farming of the north. Though there are a few farms ranging from 500 to 800 acres, the average size in the better portions of the Vale is about 200 acres in extent. On the poorer class of soils the farms are smaller, and range from 100 to 150 acres. In general the proportions of arable and pasture land are two-thirds of the former and one-third of the latter. The better class of land may be said to be in the neighbourhoods of Cardiff, Llandaff, and Sully, between Cow-bridge and the coast, and in the district of Bridgend. It is capable of growing all kinds of crops. In some parts of the hundred of Dinas Powis and other districts of the Vale the land is heavy and cold, and not adapted for the growth of roots and barley. The soils forming a sloping ridge under the outcrop of the Coal-measures, are also of very variable and secondary quality. Nearly all the farms are held on yearly tenancy, leases for a term of years being very rare exceptions. The term of entry is generally the 2nd of February, but the outgoing tenant retains the farm-house and "boosey pasture," or grass-field near the home-stead, free of extra charge, till the 1st of May following. On at least two or more of the larger estates in this part of the county the term for the entry and quitting of farms is Lady Day, viz.,

the 25th of March; but by the majority of the farmers the Candlemas term is preferred. The landlord keeps the farm-buildings in repair, and supplies field-gates either free of charge or at a nominal cost. Many of the farm-buildings are inadequate for the requirements of the farm, and in other cases they are inconveniently situated and badly arranged. The rental of accommodation grass-land in the neighbourhood of the towns may be put down at from 3*l.* to 5*l.* per acre, with the usual rates and taxes in addition; but the average maximum rental of the best mixed arable and pasture farms is about 30*s.* per acre, whilst the minimum falls as low as 10*s.* per acre, the secondary class of farms grading according to quality and position between the two latter rentals. To these rents have to be added tithes varying from 2*s.* 6*d.* to 7*s.* per acre in the different localities, and rates at from 3*s.* to 3*s.* 6*d.* in the pound, rateable value. The arable land of the whole district is chiefly farmed on the four-course rotation. There are exceptions, but these are principally on the smaller and poorer classes of farms. The stereotyped four-course consists of:—

1st. Roots.

2nd. Wheat or barley, sown down with perennial clovers and grasses.

3rd. Rye-grass and clover, chiefly cut for hay.

4th. Wheat after clover lea, and sometimes a small area of oats.

The value of roots as a cleaning crop, and one which forms the basis of success of all the others, is duly recognised, consequently much care is taken in their cultivation. Mangolds are only grown to a limited extent, swedes and yellow and white turnips occupying the greater portion of the root break. The bulk of the farmyard-manure is reserved for roots and chiefly applied in the spring. Mangolds are very liberally dressed. Swedes come second in this respect, and the common turnips have a lighter dressing. Artificial manures are also extensively used, it being found that farmyard-manure alone will not produce the desired heavy crop. Mangolds are sown on raised drills, and on the majority of farms swedes and turnips as well; but of late years drilling on the flat seems to have been gaining in favour, especially on the lighter class of soils near the coast. After the hoeing of the root crop, the scuffer is kept moving as frequently as possible between the rows. In some cases only half the allowance of artificial manure is applied at the period of sowing, the other half being applied between the rows after the leaves of the plants partially cover the ground, when the scuffer follows and intermixes it with the soil. It is considered, and with every show of reason, that the plants are thus kept in

a more progressive state during the whole period of their growth, and their liability to mildew or any other check is more averted than when the whole of the manure is applied at one time. About one-third of the crop is carted off the land and consumed by cattle in the folds, whilst the remaining two-thirds are consumed on the ground by sheep closely folded. An allowance of cake or corn, or both, is frequently given to the sheep along with the roots, and the ground is ploughed up as the hurdles are moved forward. Such is the practice pursued by the best farmers, and it scarcely need be said that it ensures a succession of excellent crops throughout the whole rotation. Spring wheat is sown from the middle of January until the end of March, and sometimes later. The soil and climate are both very favourable to its cultivation, and though sown even so late as the end of April, it seldom fails to come to maturity. Very late sowing, however, cannot be commended, as more seed is required than when sown in the end of February or the beginning of March, and the results at threshing-time are often disappointing. The quantity of seed drilled per acre is from 2 to $2\frac{1}{2}$ bushels. Barley is sown from the 1st of April to the middle of May; but here again very late sowing often brings unsatisfactory results. The month of May is generally one of the driest of the year, and at this period the strong and medium soils of the district are often difficult to reduce to the proper tilth, consequently the seed comes away at two or more growths, the crop ripens unevenly, and the quality of the sample is deteriorated for malting purposes. About 3 bushels of seed are sown per acre. It is an easy matter to moralise about the proper time for sowing, but, as all practical men know, the weather is an important factor in deciding that point. Good samples of malting barley are grown in the Vale, but this season the quality must be uneven, as few fields could be seen clear of greens or second growth. The dry spring and the poaching of the land with sheep in wet weather would contribute to this result. Whilst all the grain crops are as a rule sown with a Suffolk drill, clovers and grasses are sown by a broadcast machine, along with corn crops which succeed roots. About 12 or 14 lbs. of mixed clovers (the greater proportion being red clover and cow-grass) and half a bushel of rye-grass are sown to the acre. On clover-sick land a proportion of alsike is frequently tried, but the objection to it is its lateness in coming to maturity. For the same reason, viz. clover-sickness, a proportion of sainfoin is occasionally sown with a reduced quantity of the other clovers. Sainfoin has been a favourite crop by itself, especially on the lighter soils, but it has not been so largely grown during the recent wet seasons. It is sown with a grain crop after roots at the rate of 3 bushels per acre, costing

10s. per bushel, and it remains down for 8 or 10 years. In its green state it suits admirably for soiling purposes, viz. feeding horses and cattle in the yards. On suitable land, when well manured, it produces, when cut for hay, a heavy and valuable crop. In order to avert clover-sickness, which invariably occurs on the best-managed land cropped on the four-course rotation, the sowing of red clover is sometimes omitted, and white or Dutch clover substituted with good effect. This has to be depastured instead of being mown, and though a smaller return may be obtained for the time being, the ultimate result is satisfactory. It is a point worthy of consideration whether it would not in very many cases pay to fold the clover leas with sheep, instead of making them into hay and selling at prices which of late years have been anything but remunerative to the grower. Autumn wheat is chiefly grown after the clover leas, which are sometimes skim-ploughed before corn harvest, and converted into a bastard fallow. A second and deeper ploughing precedes the sowing of the crop in October or November. In other cases the bastard fallow is dispensed with, when the clover-stubbles are grazed to the end of September, and afterwards ploughed, pressed, and sown in October. Oats are not nearly so extensively grown as either wheat or barley. They sometimes succeed a root crop, but are more commonly grown after clover-leas depastured. The Black Tartarian variety is preferred. Catch crops, such as *Trifolium incarnatum*, winter vetches, mustard and Italian rye-grass, are great features on the best arable farms of Glamorganshire, where they are successfully grown. They produce a large quantity of valuable food for stock, and thereby help very materially to keep up the fertility of the land. They are chiefly grown on the stubbles after autumn wheat, and are cleared off the ground in time for yellow or white turnips. It is found advisable not to attempt to grow catch crops on land intended for mangolds and swedes, as the former cannot as a rule be got off the ground early enough for the main crops to follow. *Trifolium* is sown first in the catch-crop series, and as soon as possible after the white crop is removed from the ground. The other varieties of the catch-crop series follow as soon as time and circumstances will permit. Potatoes, beans, and peas are only grown to a limited extent. They are crops which in wet seasons are difficult to keep clean. These commodities come in freely from foreign markets at prices which reduce the value of the home produce below a paying point. Clover should never be sown after any of these crops until a root crop has intervened.

The above description of farming might convey the idea that the whole of this portion of the county is well farmed. This

impression would be wrong. Many of the farms are as well managed as those of the best-farmed English counties, but others again are conspicuous only for their slovenly management.

The field-gates and fences are generally fairly well kept. The latter have been reduced from their huge and straggling dimensions, for which the district was at one time noted. Lime is not now so liberally applied as formerly; but there seems a greater inclination to return to its use, and to limit the application of artificial manures.

Though the four-course rotation has been long practised, there are now many objections to the system. The land not only gets clover-sick, but to some extent root-sick. The five-course, which is attained by the grass-land remaining down two years, scarcely meets the difficulty, seeing that wheat seldom succeeds so well after a second as after a first year's seeds. The feeling runs more in favour of two white crops in succession, though this is a contravention of a long-established rule. Modern practice has, however, proved that this can be done with greater impunity than was imagined. Where the land is in high condition, it may safely be allowed, and many landlords and agents are now wisely relaxing their restrictions. When, however, theorists and farmers' friends are loudly proclaiming that corn can no longer be grown to a profit, and especially wheat, it may appear at first sight absurd to advocate the growing of corn to a greater extent. The problem remains to be solved, What other crops can be substituted in place of corn-growing? The farmer is continually being told that he must produce beef, mutton, and dairy-produce, and depend less on corn. This may be sound advice up to a certain point, but experience teaches that more of the desired products are obtained or realised on mixed arable and pasture farms than on those wholly pastoral. A certain proportion of arable land is necessary, but there is too much of it in the district in question. Instead of a proportion of two-thirds of arable to one-third of pasture, about equal quantities of both would seem to be more desirable. In this way the largest quantity of beef, mutton, and dairy-produce could be obtained, and at a reduced cost. It is difficult at present to see what can take the place of wheat, even though its price this season is only 32s. per quarter. A smaller acreage of wheat is being sown year by year, but, as all practical men know, wheat succeeds on soils where barley would be a failure, and *vice versâ*. With wheat forming part of the white crop, sowing can be going on at intervals from autumn to spring, and less horse labour and less expense is incurred than if the whole seedtime were confined to

a month or six weeks' pressure in the spring months. Instead of advocating that wheat should go out of cultivation, would it not be better to advise the British farmer to grow as good crops of wheat as he can on a limited area on soils adapted for it, and counsel the purchase of foreign grain as auxiliary feeding-stuffs, such as maize and foreign barley at present prices,—the former at 25*s.* per 480 lb., or 5*l.* 16*s.* 8*d.* per ton, the latter at 20*s.* per 400 lb., or 5*l.* 12*s.* per ton? The day has gone by when the produce of the farm sufficed to keep the farmer, his labourers, and his stock on home-grown produce. Circumstances compel him to be more cosmopolitan in thought, feeling, and action. The heavy clay-land of this portion of the county should be laid down to grass at the expense of the landlord, and it would command a higher rent, and be of greater national value than it is in its present form.

Meadows.—There is some good grass-land in the Ely and other valleys through which the rivers wind their course to the Bristol Channel. They are formed from alluvial deposits washed down from the higher grounds, and when not water-logged, produce fine herbage of good feeding quality. The area of grass-land in the Vale of Glamorgan capable of feeding a bullock without extraneous aid in the form of cake and corn, is, however, comparatively small. Though many good cattle are reared in the district, the most of them are finished off in the winter months on roots, cake, and corn. The meadow land is seldom manured, but its fertility is maintained by cake and green food, such as winter vetches, being used as auxiliary feeding-stuffs on the pastures.

Cattle.—The Hereford Cattle are the favourite breed in the Vale of Glamorgan, and there are several good herds. Very few of their owners have, however, entered their stock in the Herd-book of this breed, but those who have done so have been well repaid, as they have thereby been able to effect remunerative sales to American purchasers. There are also many good Shorthorn cattle in the district, but comparatively few pedigree animals. Herefords are generally preferred, as suiting the soil and climate. They can stand more roughing than high-bred Shorthorns. Many crosses between the Shorthorn bull and the Hereford cow are to be met with in this locality, and they make excellent butchers' beasts. This cross arises from the fact that several landowners keep a good Shorthorn bull for their own cows, and allow their tenants and neighbours to make a similar use of him. For crossing with any other breed, the Shorthorn admittedly takes the first place. A good many Irish cattle are also bought by the tenants of the

poorer farms, and many nondescripts are also to be found in this part of the county.

In the best herds the calves are reared with great care, in many instances by the pail or hand; but in pedigree herds they are allowed to suckle their dams for a longer or shorter period. At the Cowbridge Christmas market a number of Herefords and crosses at $3\frac{1}{2}$ years old have of late years been realising from 40*l.* to 50*l.* per head. Great care is taken by the best managers to keep the horned stock in a progressive state from the time of their birth until they are finished off for the butcher. In such cases cattle are comfortably housed in winter and well attended to, but there are also many examples where the young steers and heifers are allowed to be out in the fields all the winter. The general mildness of the climate enables this to be done with comparative impunity, when care is taken that the cattle have sufficient to eat. In many instances this practice is a matter of necessity, not of choice, on account of insufficient shedding accommodation. In other cases the practice is followed from a notion of economy; but it is very questionable policy, seeing that a large portion of the food consumed is taken up in merely maintaining the necessary warmth of the animal's system, so that if any progressive growth is made it is necessarily slow.

Sheep.—This part of the county has long been noted for the superior management of its sheep stock; but very serious losses were sustained in 1879 and subsequent wet seasons by fluke or liver-rot, so that the ardour of the flockmaster has been greatly damped, and the district does not now seem half stocked with sheep. Cotswolds have been the favourite breed, especially in times when long-stapled wools brought a good price. There has also been for many years a mixture of pure and cross-bred Hampshire, Leicester, and Oxford Down Sheep, and other crosses. Though in several instances a regular breeding-flock is kept, the majority of the farmers keep a flying stock by purchasing draft ewes in the autumn. A few of the lambs are sometimes sold off fat, but the more general practice is to keep them on during the following winter on roots and cake, and dispose of them in the spring as fat tegs. This system answered well so long as sound ewes could be purchased, but great risks in this respect have existed during the past five or six years. In all cases fluke was not wholly imported into the locality, for a rather considerable area of undrained land, even in this favoured part of the county, is unsound for sheep. It is the custom throughout the county to shear the lambs in the early part of summer, and experience proves that they thrive better than when they have a heavy coat to carry in so humid a

climate throughout the winter. The Cotswold and other heavy breeds are rather losing favour, not only on account of the low price of wool, which applies to all classes, but more particularly on account of their being objected to by the butcher, who finds the mutton too fat to suit the tastes of his customers. The Shropshire Down would seem to be the coming sheep to meet the objections raised. Its mutton suits the taste of the most fastidious; it grows a close good fleece, which is desirable in a damp climate. This breed also suits well for close folding. It seems admirably adapted for the better class of land in this district, whilst crosses of the same breed, such as the Clun Forest and Radnor Sheep, would suit the poorer soils.

Horses.—The horses of this part of the county are short-legged, heavy-bodied, and active. Breeding is not carried out to a great extent, though during recent years it has been on the increase. There is not sufficient grass-land, as a rule, to admit of this on any considerable scale, and it is to be regretted, as this class of horse is in great demand for the collieries and iron-works in the county. The management of farm-horses in this district is somewhat peculiar. In many instances they lie out in the fields during summer and winter, and are only brought into the stables to be baited and harnessed for work. In other cases they are kept in open foldyards all the year round, and are fed in summer on vetches and other grain crops, along with an allowance of corn. The advocates of these methods say that the horses are more healthy than when tied up in stalls in the stable. This may be so, but the practice gives the animals a rough and unkempt appearance.

Pigs.—The pigs of this part of the county have been greatly improved of late years by crossing with the Berkshire breed. The Large White or Yorkshire breed has been less used, but as a cross with the somewhat coarse native pig it would produce heavier bacon than the crossed Berkshire. Berkshire and Berkshire crosses make, however, the best porkers.

Implements.—The implements used in this part of the county are generally of the most modern type and by the best makers, forming a marked contrast to those of the hill district, where they are of the most primitive kind. Many self-delivery reaping-machines have been in use for years past, and this season, when string-binders have reached to a high point of perfection, several of these were purchased by the most enterprising tenants. I saw three at work in the neighbourhood of Cowbridge, and it was gratifying to find that they gave unqualified satisfaction. There is only one set of steam tackle in the county, and this is a roundabout set. This is used on a 700-acre farm, two-thirds of which are arable, and it has enabled the tenant to

dispense with four pairs of horses. This cannot fail to be a profitable investment on a farm of that size, where the fields are large and otherwise adapted for steam-ploughing. On the smaller farms, steam cultivation could only pay on the hire system, and it is well known that, whether in the hands of individuals or companies, the plan of letting out or cultivating by the acre has been an unprofitable speculation as a rule. On small farms the fields are also small, and often irregular in shape, and ill-adapted for steam ploughing. A somewhat unfavourable impression has been formed of steam cultivation, owing to the fact that a few years ago some of the worst arable land in the county, near to Penarth, was deeply ploughed by steam, and instead of this making it more productive it rendered it still more barren. The stiff cold clay subsoil has not even yet yielded to the ameliorating influences of rains and frosts. A portion of it has been planted with timber, and this seems to be the best use it could be put to. If any fault can be found with the scenery of the Vale of Glamorgan it is on the score of deficiency of timber. On the poorest land, timber would surely pay in a county where many thousands of tons are annually used in the collieries.

Labour.—The labour question is one which presses rather heavily on the farmer. The proximity to large works, docks, and railways, where high wages are earned, has the effect of drawing off men from the agricultural districts and of increasing the wages of those who remain. Married men have in this district from 14*s.* to 15*s.* per week, with a free cottage and garden, and beer and victuals in hay-time and harvest. Single men boarded in the farm-house have from 18*l.* to 24*l.* per annum, according to ability. The want of sufficient cottage accommodation is in many cases greatly complained of. Some landlords have put up model cottages on their estates, but they are exceptions. On other estates, the old romantic thatched cottages are allowed to tumble down, and are not rebuilt. The result is that labourers have to go to the nearest hamlet or village for house-accommodation, and having to reside some distance from their work, time and energy are both wasted in travelling to and fro.

The labour bill on the best-managed farms is from 25*s.* to 30*s.* per acre, and were it not that an admirable system of task-work prevails, it would be much higher. The farmer and the labourer both benefit by the practice. Work is more expeditiously done, and the servants are encouraged in their efforts to earn larger wages. In one case which came under my notice, the farmer's son was a participator in 6*s.* per acre for cutting, tying, and stooking a good field of wheat, a

Hornsby's self-delivery reaper and pair of horses being allowed. In another case, where Hornsby's string-binder was used, 8*d.* per acre was given for cutting, 1*s.* for stooking, and from 4*s.* to 5*s.* per acre for carrying and stacking, horses and implements being of course always allowed. Six shillings per acre is given for hoeing or thinning turnips the first time, and 3*s.* for the second hoeing. Beer is allowed in hay-time and harvest, in addition to the above, at the rate of one gallon (costing 8*d.* or 9*d.*) per acre on the crop. In some cases the allowance for beer is more liberal; but it is considered that 1*s.* per acre should be the maximum, or say for 80 acres of corn the beer-bill should not exceed 4*l.* In many instances it is brewed on the premises. It would be well if the piece-work system were more resorted to in other parts of the country. A shrewd Glamorganshire farmer, speaking of it, said that he even extended it to his garden, which he let out at a certain price per perch for digging. The farm labourers of the Vale are good average workmen. They are good ploughmen, and they can manage corn-drills, reaping- and mowing-machines, with ease and dexterity. They are particularly neat in rick-making and thatching.

Tenant Right.—The local tenant right demands a passing notice. It has long been in existence, and doubtless to it nearly everything good in the farming of this division of the county owes its position. It has afforded security for permanent and other improvements, which, instead of being relaxed towards the expiration of a tenancy, were too frequently vigorously extended, to make up a heavy bill for the incoming tenant. The principle of the system was right, but in the hands of unscrupulous men it was often abused. The Agricultural Holdings Act of 1883 is based on much the same principles as the local tenant right, but it is more comprehensive, although it does not enumerate all matters of minor detail. In my own opinion the Act will strengthen the weak points of the local custom, and it appears comprehensive enough to embrace what is good of the former system. A more searching enquiry is attainable under the Act, inasmuch as valuers have now the power to put witnesses on oath, and the chances of imposition are thereby lessened. Under the old custom the tenant-right bill amounted on the better class of farms to sums varying from 20*s.* to 60*s.* per acre, according to the state of cultivation and cleanliness of the farms. When such large amounts of an entering tenant's capital have to be sunk in this way, it is only fair that the fullest and most accurate details of the claims should be produced; on the other hand, the Legislature and the country are of opinion that the outgoing tenant should have justice done to him in the way of compensation for unexhausted improve-

ments. The majority of farmers express a preference for the "old custom," with which they are familiar, and they look with a certain amount of distrust upon the new and comparatively untried Act. They would have preferred that the decision of the arbitrators and their umpire had been final, and they fear that the right of appeal under the Act to courts of law when the award exceeds 100*l.* will lead to much needless and costly litigation. It is to be hoped that such apprehension will not be realised. It is contended that by the local tenant right, compensation was allowed for acts of husbandry and other matters of which the Agricultural Holdings Act takes no cognisance. On the other hand, the Act allows the tenant compensation for land laid down to permanent pasture with the consent of the landlord, whilst local custom did not embrace this in its code. It is expected that these anomalies will be adjusted, and that a scale forming the basis of compensation will be arrived at by the practised valuers of the county in conformity with the Act, and will at the same time embrace so much of the details of local custom as it is desirable to retain.

General.—Dairy farming is not followed to any great extent, except in the suburbs of the larger towns, where it takes the form of a milk supply. It is questionable if any branch of farming is more profitable than this. Large quantities of milk are sent daily from Somersetshire, Monmouthshire, and other adjoining counties, not only to Cardiff, but to the populous valleys of the hill districts.

When agricultural depression in the arable counties of England was at its most severe point, say about two years ago, it was frequently remarked by the local press and by public speakers that the farmers of this part of the county, if not wholly exempt, did not feel the pressure so much as their English neighbours. It was quoted as a proof of this that no farms were then unlet; but the position is somewhat different now. There are at the present time more farms in the market and more land in the owners' own hands than has been the case for forty years. The high farming for which this division has been long noted is not now being maintained. Lighter crops are being produced, and the land is becoming more foul. A large proportion of the farms are insufficiently stocked with sheep and cattle, and much of the produce in the form of hay, straw, and even roots, is being sold off the land. The causes of this are only too apparent. A succession of unfavourable harvests for the past six or seven years, great losses of sheep, and the unremunerative prices of wheat and other grain, have all contributed to the reduction of the tenant-farmers'

capital. The fine weather of 1884 has unfortunately not greatly improved matters. Wheat has not been lower, if so low, in price during the present century; and though of fine quality, the quantity per acre is below the average. The hay crop was also light, and the value of live-stock is at present lower than it has been for years. The farmers have been and are provident and hard-working men, with generally a fair amount of capital for the size of their holdings, and for these reasons have been able to bear the pressure of bad seasons and adverse times somewhat longer than others less favourably situated. The crisis is now, however, a grave one, not only for farmers, but also for landowners. How it has to be dealt with is the problem of the day in the Agricultural world. I do not presume to attempt to solve it. However badly landed estates may pay, there seems no alternative but for the rents of arable land to be reduced. As previously stated, at least one-third of the arable land of this division should be laid down to permanent pasture, wet and unsound land should be drained, and the farm-buildings and labourers' cottages, which are in many cases inadequate, should be made to suit the requirements of the farm. To indicate that these extensive improvements should all be carried out by the landlord, and that at the same time he should accept a reduced rent, would appear to many who have only a life interest in their estates an advocacy of the confiscation of the rights of property. It is to be hoped that matters will be reasonably and amicably adjusted between landlord and tenant, and it is gratifying to have to record the fact that this is being done at the present time in several instances in the Vale of Glamorgan.

GOWER, OR WEST GLAMORGAN.

The peninsula of Gower forms the south-western extremity of the county. Its area is about 56,000 acres. The northern portion rests on the Coal-measures, and may be classed with the pastoral or hill land of the county. The southern half rests on the Mountain Limestone and Old Red Sandstone, and forms chiefly the cultivated portion of the district. A detailed description of the arable farming of this locality would be to a great extent a repetition of that of the Vale. The land is lighter and more friable than that resting on the Lias formation. It is good turnip and barley land. The average size of the farms in Gower is from 90 to 100 acres. They are held on yearly tenancy. The rents are considered reasonable, and the tenants are prosperous. Wheat is not largely grown, neither are catch crops, but with these exceptions the farm management is similar to that of South Glamorgan.

No portion of the county has made greater strides in improvement during the present century than this. Seventy years ago there were scarcely any roads, and wheeled vehicles were almost unknown. The farm produce was conveyed to market on horses' backs, and the greater portion of manure to the land in the same way. Fifty years ago the farming of the district had scarcely emerged from its primitive condition. Patches of wheat and other grain were grown until the soil became exhausted, when it had a rest in bare fallow, after which the same process of cropping was repeated. The management of the live-stock corresponded with that of the land, and what was sold went off in store condition to other parts of the country. About, or shortly after the period just referred to, the Lord-Lieutenant of the county, C. R. M. Talbot, Esq., introduced turnip-growing. The example of the alternate system of cropping pursued was gradually followed by the tenant-farmers, and by slow but sure degrees the whole aspect of Gower became changed for the better. Though the style of farming now practised cannot claim to have reached perfection, there is much to commend where formerly nearly everything was adversely criticised, if not condemned. There are now excellent roads throughout the district. The land produces good crops of roots, grain, and grass. The cattle have during recent years been greatly improved, chiefly by using Shorthorn bulls. There are a few Herefords in the district, but the majority are Shorthorn crosses. The sheep-stock has been improved in a similar way to the cattle, by crossing the mountain breed with Shropshire Down and other rams. The principal landlords have fostered and encouraged the improved breeding of stock by introducing pure-bred animals into the district. The result has been that, instead of a number of ill-bred store animals being produced, the live-stock is chiefly fattened off on roots for the butcher. Dairy-farming is not practised to any extent, and it is confined to a few small farms near Swansea.

There is a considerable area of common land in Gower which is more or less hilly, and principally stocked with mountain sheep and Welsh ponies. There is nothing particular to report respecting these commons excepting that they are frequently overstocked, and that in consequence the sheep are smaller and more stunted than they ought to be. The ponies are probably the best class in the county. Though their management is chiefly left to nature and chance, many hardy, high-stepping, and beautiful animals are reared, from which matched pairs are often selected. They are generally sold at Neath fairs, and many of them are bought by London dealers.

Direct reference to any particular estate or farm has been studiously avoided up to this point, but I venture to hope

that a departure from this line may be justified in treating of the farming of Gower. The principal landowners are, C. R. M. Talbot, Esq., T. Penrice, Esq., and Sir Hussey Vivian, Bart., and their estates possess several features of interest to agriculturists. A home farm is kept in hand on each of the estates referred to, and the management is generally on the most approved principles. To enter into the details of each, or any of them, would outstep the limits of a general essay. Justice to the farming of Gower can scarcely be done without some reference to Park-le-Breos, the home farm of Sir Hussey Vivian, which is more particularly noted for its Shorthorns. The herd, though established within recent years, has already made its presence felt in most of the Showyards of the United Kingdom. These Shorthorns are of Bates blood, and they are kept more for useful home dairy purposes than for sale or exhibition. Sir Hussey Vivian takes great personal interest in the herd, and he contends that a well-bred animal is as cheaply kept as a mongrel, and gives much more satisfaction to the owner. The greatest care is taken in the selection of sires and dams to maintain and improve the purity of this herd, which is the principal one in the county, and it may safely be predicted that it will yet attain a much higher standard of excellence. In addition to its Shorthorns, the home farm of Park-le-Breos is stocked with a select flock of Shropshire Down sheep, several good Clydesdale horses, and good classes of the Large and Middle White breed of pigs. The farm-buildings are commodious and conveniently arranged. A special feature is a permanent tramway to all parts of them, for conveying food to the stock, and the manure from the yards and boxes, to a covered depot specially made for its reception. This is the only farm in the county where so much attention is given to the manure-heap. The liquid manure is also utilised. It is carefully collected into a tank and pumped over the large manure-heap in the depot. This ought to teach a lesson in a county where manure is generally so much wasted, and otherwise neglected, by in many cases allowing the best ingredients of it to be washed into the nearest brook or stream. The machinery for threshing, sawing timber, grinding and crushing corn, and pulping roots, is driven by water-power, and is neatly and conveniently arranged.

THE HILL DISTRICTS OF THE COUNTY.

The area under this heading includes the whole of the land resting on the Coal-measures, or fully two-thirds of the whole area of the county. The northern portion of Gower is, however,

included in this estimate. There may be said to be three classes of farms in this division, viz. :—

1st. The hill and half-hill farms.

2nd. The small dairy or grazing farms which have no mountain land attached to them.

3rd. The hill farms proper, which have only a few fields, chiefly in grass, near the homestead and the mountain land behind it.

First.—The hill and half-hill farms have certain proportions of arable land whereon roots and corn are grown. The arable portion of some of these farms is managed in most respects like that of the best farms of the vale. In other cases it is seldom that any regular rotation is practised in cropping, and the tendency has of late years been in the direction of letting the cultivated land remain down in grass. When this is done the fences are frequently neglected, excepting perhaps the dividing one between the mountain-land and the field-land, and that forming the boundary fence of the farm and the liability to maintain the latter is frequently shared with an adjoining tenant. When the “inbye” or field-land is grazed under such conditions, the animals generally run through or over the cross fences, and this gives a ragged and slovenly appearance to the whole farm. The sheep stock kept on the “mountain” or “hill” portion of the farm is generally its mainstay, but in other cases the cattle may be said to be so. The sheep are, as a rule, a cross between the Radnor and the native mountain breed, or a stronger, heavier, and better class of the mountain sheep of the county. The ewes and their produce of the previous year, locally called “yearlings,” are brought down from the mountain to the low ground during the winter. This treatment alone produces a much heavier sheep than the purely hill or mountain farms can do. In not a few instances a flying stock, especially of ewes, is kept on a farm of this kind. Cross-bred ewes from the borders of Radnorshire and elsewhere are bought, and their produce is sold off in fat lambs. The wedder stock on the mountain is kept up by purchasers of one-year-old wedder sheep in the spring, to take the place of the autumn draft of three- and four-year-old wedders. The young wedders are chiefly bought at Brecon fairs and markets at prices ranging from 17s. to 21s. This latter practice seems to be gaining in favour. The ewes are crossed with a Shropshire or other pure-bred ram, and the lambs bring from 27s. to 30s. each. These prices are seldom exceeded by the average class of three- and four-year-old mountain wedders.

The cattle kept on the class of farm under consideration are almost invariably Herefords, and very frequently they are good

specimens of the breed. They consist chiefly of a dozen or more cows, according to the size of the farm, and young steers and heifers of from one to two years old. The calves are generally all reared, and the young stock, especially the steers, are sold off in store condition at two years old, along with several of the barren or draft cows from the stock in the spring months. They are, as a rule, readily purchased by dealers, who take them to Northamptonshire and other grazing districts in England. The best of the heifers are retained to keep up the stock of cows. I have often noted the excellence and purity of a Hereford herd of cattle, even under unfavourable conditions, on a farm of the kind just described. The tenants of such farms have generally done fairly well during recent years.

Second.—The small dairy or grazing farms of the hill districts are stocked with Hereford cows not too highly bred. The number of cows ranges from 12 to 20 or more. The most of the calves are fattened and sold to the butcher at from 3*l.* to 5*l.* each, or at the rate of 9*d.* to 10*d.* per lb. A few of the heifer calves are reared to keep up the stock. As soon as the fat calves are disposed of (and several go off about Easter, when veal is in great request), the making of cheese commences. A class of thin-shaped, mild-flavoured, but wholesome and agreeable cheese is made, which is known as Caerphilly cheese, so named after the place where the market is held for its weekly sale. The Caerphilly cheese, though not much appreciated out of the county, is preferred by the thousands of colliers and others to most other varieties, and it finds a ready sale in a comparatively new state at prices ranging from 60*s.* to 70*s.* per cwt. A considerable number of small farmers follow this class of farming, and though they cannot amass fortunes, they are able to pay their way and make a living. Some of these small dairy farms have the neatest and most orderly appearance of any in the hill districts of the county. Milk-selling would probably pay better than cheese; but the latter is more portable and handy, for instead of a delivery twice a day, a weekly or fortnightly drive to the cheese market is all that is necessary. It seems, however, anomalous that milk is sent from long distances to the very districts where cheese-making continues to be the leading feature. This may probably be accounted for by the fact that the supply of Caerphilly cheese does not meet the demand, and that cheese is generally in greater request in Glamorganshire than either milk or butter. Another and perhaps stronger reason may be the fact that cheese-making runs in an old groove, whereas the now growing demand for milk dates from a very recent period. Cheese forms the staple of the Welsh colliers' dinner or midday meal in the mine.

The Welsh farmer's wife may not know much of cream separators or the most scientific methods of dairy manipulation, but she is cleanly and careful, and she produces an article of diet to meet local wants, which is appreciated in any form, whether mild or matured, or toasted in the form of Welsh "rare bit." It is gratifying to find that the demand for milk is now largely on the increase in the populous mining districts, where infant mortality has been, and is yet, abnormally high.

Third.—The hill farms proper, or mountain sheep-farms, are also, as a rule, comparatively small holdings, the rentals of which run from 40*l.* to 60*l.* per annum on the average, whilst some few exceptions are rented at 100*l.* or more. The average stock is from 300 to 400 Welsh mountain sheep, and from 4 to 6 cows and 8 or 10 young cattle, 2 horses or cobs, a couple of bacon pigs, and in some cases a few ponies. Some of the farms may with difficulty maintain the above stock, but in many instances rights exist to send 50 or 100 or more sheep to one of the many unenclosed mountain commons. In some cases these rights of pasturage on the common are a great advantage; in others, where these commons are overstocked, they are of comparatively little value. In general they are commons without stint; but in some cases a district code of rules has been arranged, apportioning to each farm the number of head of stock to be grazed, and this to a great extent counteracts abuses.

The mountain land of Glamorganshire, though not rising to a great elevation, is bare, bleak, and unsheltered. Its average value may be put down at from 3*s.* to 3*s.* 6*d.* per acre per annum, whilst the enclosed patches around the homestead may be valued at from 7*s.* 6*d.* to 10*s.* per acre. The Welsh mountain sheep are small, with few good points in shape and symmetry. They have white faces and legs, and, as a rule, they are without horns, and they grow a short close wool not wholly devoid of "kempy" hairs. Some of them have brown or tawny legs and faces, and these are considered good points, denoting hardiness of constitution. It is no easy task to increase the size and weight of the Welsh sheep on its native hills. The geological formation of the mountain land, and its elevation, are both unfavourable to the growth of the finer grasses, and there is almost a total absence of heather and many of the more valuable mosses so much prized in sheep-walks in other parts of the country for spring keep. The Welsh sheep fare pretty well in summer; but theirs is a case of very short commons in winter, hence their diminutive size and scraggy form. The average weight of the mountain ewe, when fat, at 4 or 5 years old is 28 lbs., or 7 lbs. per quarter, whilst the wedder at

4 years does well if he comes up to 40 lbs., or 10 lbs. per quarter. Most of the writers on British sheep dispose of those of Wales in a single sentence, or thereabouts, as scarcely being worthy of notice; but in spite of this they are the class of sheep better adapted than any other as a distinct breed for the whole of the hill districts of South Wales. They are justly celebrated for the quality and flavour of their mutton, which attains perfection at four years old.

I have myself been trying to improve the native mountain breed of sheep for the last twelve years; but, I am compelled to confess, with very varying success. Attempts at improvement are generally in the direction of crossing the native breed with Cheviot, Scotch Black-faced and other rams, but unless the produce is much better kept during winter than is usually the case, the cross-bred stock prove a comparative failure. Many north-country men have made persistent efforts to substitute Cheviots or Cheviot crosses for the Welsh sheep, but have been compelled at last to abandon them, after buying their experience somewhat dearly. Cheviot crosses have succeeded better on the more grassy hills of Brecknockshire, which rest on the Old Red Sandstone, but they rarely succeed on hills lying on the Coal-measures. It is found that the hill sheep of the district are most safely and surely improved by importations from Cardiganshire, North Wales, and other parts of the Principality. A judicious selection of rams, and breeding in direct line with the Welsh sheep, is found to answer the sheep-walks of the district better than radical crosses, which produce heavier animals, but which are too heavy and too tender for the quality of the grazings to maintain. It is an easy matter to criticise, and even ridicule, the live-stock and the customs of any district, but due regard must be paid to both in prosecuting any improvements that are likely to result in success.

On the mountain farms of Glamorganshire, the sheep of all ages necessarily graze together, owing to the smallness of the grazings. When there are rights to grazing on a common, the older wedders are generally sent there, as they are stronger and better able to rough it than the ewes or yearling sheep. It is contrary to the practice of North-country hill-farmers to allow their whole flock to graze together. In their case the holdings are much larger than those in this county; and the sheep are divided into "hirsels" on separate walks, to suit the ages and sexes of the flock. A wedder hirsle, or flock, has the most elevated walk, and the ewes and young sheep have each the walk best adapted for them. The Welsh flock consists of all ages, and many farmers contend, with every show of reason, that the sheep stock are more healthy when kept in this way than if they were

divided. The older sheep guide the younger to places of shelter in a storm, and also to the better herbage on the mountain. Few, comparatively, of the Welsh hills are enclosed, the boundary of the farms being the remains of an old wall, or a stone set on end, or no boundary at all. The parties interested, however, know the line to which their stock can graze. The sheep are often disturbed more than necessary by doggings and coursings on the boundaries of the various farms. Many of the mountain farmers of Glamorganshire are content, not only to let their whole flock graze together all the year round, but to leave the management in a great measure to nature and chance. With the exception of shearing, dipping, and one or more operations of absolute necessity, the rest is left to fate. In the autumn the flock is gathered, and the small draft of, say, 30 or 40 ewes, and the like number of wedders, is taken from the stock for sale. The rams are allowed, in very many instances, to graze with the flock the whole year round. The result is that a few straggling lambs begin to appear about the beginning of February, and lambing is continued at intervals till May. The early lambs are generally the produce of ewes which have been barren the previous year. There is little or no attempt at management in this direction, and it must be confessed that its want is much too general. The rams should not be put to the ewes till the end of October, and the bulk of the lambs should be dropped in April. The Welsh mountain ewe is a capital nurse, and on very scanty fare it is surprising how well she rears her lamb. In my own opinion all the lambs should be weaned by the middle or end of August, and, after being kept three weeks or a month from their mothers, they may be allowed to return to the hill if accommodation elsewhere is not convenient. In some cases this may be quite impracticable, but it is none the less desirable. It is very seldom practised under any circumstances. The weaning is left to nature, excepting when a portion of the lambs are sent off in October "to tack" for the winter upon lower lying farms where few or no sheep are kept. Tacking is becoming much more general, as it is found that the reduced death-rate gained by it compensates for the outlay of 4s. 6d. to 5s. per head for the winter's keep. It is also found that those which have been "boarded out" grow into heavier and better sheep than those that have never been away from their native hill. The hill districts of Glamorgan did not escape the ravages of liver-rot so prevalent throughout the country in 1879 and subsequent years. The losses were in many cases excessive, amounting to 20 and 30 per cent. of the entire flock. There are many flocks still more or less tainted, so that a few dry seasons will yet be required to bring them to a normally healthy condition. The hill-farmer of the county does

little or nothing to prevent or counteract the tendency to rot. Open-surface drains, so common in other hill districts, are seldom to be seen. It is not often that any hay is given to the sheep stock during winter. The necessary surface-draining could frequently be done at a very small cost, and this, as well as giving hay to the sheep in winter, would well repay the outlay.

The management of the hill flocks is thus open to severe criticism. With respect to draining, the hill farmer does not believe in spending money. His creed is, to keep what he has got, and by frugal and careful habits to add to it. On pointing out to him the advisability of giving hay to his sheep, he generally asks where he is to get it, as the cattle require all that the meadow land produces. It is of little avail to reply that the farmers on the Cheviots and other ranges cut the grassy patches on the hill-side from amongst the sheep's feet, and make the produce into hay, and rick it near to where it has grown. The best managers of the north-country hill-farms are always provided with hay of this kind, to meet severe winters and late springs. The prices obtained for North-country hill stock are higher by from 30 to 40 per cent. than those obtained for the hill sheep of South Wales. I have often put this question to myself, What is the reason of this?

In reflecting on the answer, it must be admitted that the grazings here are secondary in quality when compared with those of the border hills between England and Scotland, and that there is no demand in Glamorganshire corresponding to that in the North of England for store stock; but the small native sheep, when brought to maturity for the scales, command a price per lb. in the local markets scarcely second to that given for other breeds in the best markets of the Kingdom. It must be admitted that any difference in position is insufficient to account for such a striking contrast in prices, and that a large percentage must be debited to careless, defective, and short-sighted management in Glamorganshire and South Wales. I have come to this conclusion in no offensive spirit. Reflection is made on my own management as much as on that of the censured unknown, with the hope that redoubled efforts may bring up South Wales to a more respectable position as a pastoral district.

The cattle on the mountain farms have of necessity more attention bestowed upon them than the sheep stock, but at best the management is simple and primitive. Hay is the staple of their winter keep. If the hay season has been good, the cattle tide over the winter pretty well, with a daily run out to the woods or pastures near the farm-buildings; but if the hay-crop has been badly got, the bovine family fare worse, and bear evidence of the winter's poor keep when turned out in the spring

months. The breed shows its relationship to the Hereford by retaining the white face, but, excepting this distinctive feature, the animals may be described as nondescripts, with few good points about them. Their best feature is their hardihood; but aptitude to fatten has been sacrificed to this. There is doubtless method in the madness of having ill-bred hardy animals for high situations, but it frequently appears to be overdone. A few fairly good cows may sometimes be seen, but a decided check to a better stock is given by "harking back" to a nondescript bull. It has often puzzled me to know where this animal is found. The calves are generally reared, and with the exception of a heifer or heifers retained to keep up the stock, they are sold as stores at two years old. The sale of cattle in spring meets the summer half-year's rent, whilst the draft from the sheep in the autumn meets that of the winter.

The implements on the hill-farms are few in number, and primitive in form. The hay is carried to the rick on home-made cars without wheels, called in Welsh "*Car Llusg*;" but in more favoured situations, where the acclivities are not so great, a modification of the harvest-cart of the corn districts is used. It is mounted on low wheels, and is called a *gambo*. It is a most useful article in high-lying districts.

The horse of the hill-farms of the county may be described as a cob, or a hybrid by many crosses between the horse proper and the mountain pony. It is a most useful animal, with short legs, fitting it for climbing the hillsides. It is generally low, and somewhat thick in the shoulder, and plain in the hind-quarters. Even with these defects it is a hardy and enduring animal. The Welsh cob, so much in repute in the London market, is, however, very difficult to find. There are all the elements for breeding cobs, but it does not seem to be a paying pursuit, for after a few years' experience it is generally abandoned. Several gentlemen amateurs prosecute horse-breeding more than the tenant-farmer. It would be well if more landlords followed the example of Lord Tredegar in Monmouthshire, who keeps three stud stallions at Tredegar Park, viz. a thoroughbred roadster, a Shire-bred cart-horse, and a Norfolk trotting cob, to all of which his tenants can send their mares for service free of charge.

The farmers of the Glamorganshire hills have in a great measure escaped the wave of depression which has so much affected those engaged in arable farming in Great Britain during recent years. Though losses have been sustained by the death of stock of late, and though the price of wool has been low, good prices have been ruling for beef and mutton, and store stock has for several years been relatively higher than

fat animals. A reaction has taken place this autumn, but it has not affected the value of hill stock to such an extent as sheep and cattle in arable counties. By hard and careful living, the farmers of the hill districts have been able to save money, and though they make no parade of it, some of them can draw a comparatively long purse from an obscure corner for the purchase of a small freehold when opportunity offers. There is no lack of competition for farms when they become vacant; but landlords rarely disturb old tenants, and very seldom raise their rents.

SPECIAL TYPES OF FARMING.

Colliery Farms.—When farms become vacant in the neighbourhood of the collieries, the coal-owners or colliery companies frequently rent them. In one case with which I am individually familiar, a colliery company has a dozen or more of the small hill-farms in hand. The former tenants were in no case forced to give up their holdings, but in a few instances a new industry led them to change their avocation. The colliery companies, as a rule, spare no reasonable expense to carry on the farms with the same spirit as their large commercial concerns. In the case referred to, the situation is in one of the widest valleys of the county. Large areas of land have been drained, reclaimed, and laid down to grass. The meadow and reclaimed land is chiefly mown for hay, and from 500 to 600 tons are grown annually. The live-stock consists chiefly of 400 horses underground, about 4000 sheep on the mountains, and 150 cattle. The farms are simply auxiliaries to the pits, and though the profits are not large, they pay a fair percentage on the capital invested. The Welsh mountain sheep are kept on farms where no roots are grown, but as much care as possible is taken in the selection of rams, and breeding is now pursued in the direct line by a selection of the best native rams. Hay is liberally supplied to the hill stock in severe weather. Many crosses of the sheep stock have been tried, but the most successful has been that between the Shropshire ram and the mountain ewe. This is carried out on a range of hills 900 feet above the level of the sea; but turnips are successfully grown at the bottom, and it need scarcely be said that therein lies the whole secret of success. The result of the cross is, that the produce goes off fat under two years old, and realises from 10*s.* to 12*s.* per head more money than the four-years-old mountain wedder. Doubtless the weight of wool is also clipped, the cross-breed yielding from 4 to 5 lbs., whereas the average mountain fleece weighs only from 2 to 2½ lbs. The cattle on the group of farms

referred to consists chiefly of West Highlanders, and otherwise of crosses between the Shorthorn bull and the West Highland heifer. These are bred on the farms, and in addition a number of Hereford steers are bought annually to graze the aftermath in the autumn, and are finished off on roots and cake. On the most exposed farms, pure Highlanders are bred, whilst Highland crosses are reared on a better class of hill farms, and they are eventually brought down to the meadows to be fed off in the company of the Herefords. The West Highland cattle suit the district well, as, being hardy, they can as stores remain out all the winter on a moderate allowance of inferior hay in addition to what grass they can pick up on the pasture land. Where shedding accommodation is inadequate, and it is generally so over the whole of the hill districts, the inconvenience is greatly lessened by breeding a class of cattle that can in a great measure dispense with it. The West Highland cattle do not come up to the weights of some other breeds, but they are reared at correspondingly less cost. Haymaking, in a changeable and damp climate like that of Glamorganshire, is often a tedious and expensive process. On the group of farms under review, great practical benefit has been realised during the last two years by the adoption of the Neilsen system of drying hay in the rick. A fan has been attached to a fixed steam-engine (used for cutting chaff and bruising corn for horses), and by piping has been connected with a range of sheds or Dutch barns, which hold more than 200 tons of hay. The plant, with all labour, cost about 60*l.*, and was supplied by Mr. C. D. Phillips, of Newport, Mon. At no additional cost beyond the first outlay the fan can, by opening or shutting the dampers underneath the ricks, be applied or shut off from any portion of the range. It is not contended that this system can make hay in wet weather, or even dry it satisfactorily when put together in a wet state, but its utility consists in enabling hay to be carried two or three days before this could be done with safety where no appliance of the kind exists. The risk of over-heating can be counteracted and regulated at pleasure. The benefit of being able to carry a lot of hay quickly, and so avoid being overtaken by an impending storm of rain, has been fully proved by experience.

Silage.—Silage has also been tried on a small scale. In the early autumn of 1883, two pits, one above ground, the other under ground, were filled respectively with grass and vetches, and weighted with pig-iron. The above-ground silo, filled with grass in a green and succulent but dry state, proved a great success; the other, filled with vetches half ripe, proved a comparative failure. The dry and withered vetches were found to be ill-adapted for the system.

In the early autumn of 1884, three silos were all filled with grass, and in two of them mechanical means of pressure were applied, whilst the third has been weighted with pig-iron as before. The silage is given exclusively to the horned stock in winter, along with other food; and whilst it can never be expected to take the place of hay, which is an indispensable article of diet for hard-working horses, it is likely to become a great auxiliary in cattle and even sheep feeding in a climate where grass grows so well, but at the same time where it is so difficult to make it into good hay.

Sewage Farm.—The county of Glamorgan has a sewage farm of some interest, and which is successful, especially when looked at from the balance-sheet point of view. It may produce much less valuable crops than many others of its class, but the reduced expense of labour has been of late years the feature which has chiefly contributed to success. The farm in question is under the jurisdiction of the Merthyr Tydfil and Aberdare Local Boards of Health. It is 400 acres in extent, and it receives the sewage of a population of 90,000 persons, viz. the inhabitants of Merthyr Tydfil, Dowlais, Aberdare, and Mountain Ash. The land is situated in the narrow valley of the upper portion of the Taff river, and extends from about a mile below Merthyr Tydfil to within a mile of Pontypridd. The upper portion of the land receives the sewage of Merthyr and Dowlais; whilst the lower, extending eastwards from the point where the river Cynon flows into the Taff, receives the sewage of the Aberdare valley. The Merthyr sewage can, if desired, be conveyed over nearly the whole of the area. The disposal of the sewage of the Merthyr valley was the work at first taken in hand, and a scheme on a limited area of ground was devised by the well-known Mr. Bailey Denton on the downward filtration system. The arable farming and market gardening at first pursued, proved, after years of trial, a financial failure. More land had to be acquired to dispose of the sewage after the house drainage of the towns had been completed. A modification of Mr. Bailey Denton's plan was followed in the extension of the intermittent system. Arable farming and market gardening have now nearly been abandoned, and the sewage is distributed chiefly over grass-land, which is let by auction annually for grazing or haymaking, or both, at rents ranging from 5*l.* to 10*l.* per acre. The labour is confined chiefly to distribution of the sewage, to cleaning straining-tanks, and to keeping the fences in repair. The agricultural value of the land, though situated in the most fertile portions of the valley, previous to being sewaged did not exceed 30*s.* per acre.

Woods and Plantations.—The hill districts of the county are

not very favourable to the growth of the best class of timber. The soils, resting on the shales and sandstones of the carboniferous formation, are poor and uncertain. The situations are for the most part exposed to strong westerly gales from the Atlantic Ocean.

The Agricultural Returns show that 23,687 acres are occupied by timber in the county. The greater proportion of this acreage must consist of coppices, as the area occupied by heavy timber is not large. The coppices are chiefly grown in the northern districts and on the sloping hillsides. They are cut down and cleared off after thirty years' growth, and realise at present prices from 18*l.* to 20*l.* per acre. The stools are left to produce another crop, and without any treatment a like result is attained at the expiration of the next thirty years, subject, of course, to the value of timber for the time being.

Where Scotch fir, spruce, alder, oak, and birch have been judiciously planted on exposed situations on the hillsides, a clear income of 10*s.* or 12*s.* per acre has been the average result. My own experience of the average cost of planting has been the following, viz. :—

	Per Acre.		
	£	s.	d.
Clearing the ground of rubbish, briars, &c.	0	10	0
Draining, viz., open drains, 30 in. wide at the top, and 6 in. at the bottom	1	0	0
Plants (miscellaneous) and planting	6	0	0
Total	£7	10	0

In favourable situations on the sides of the hills, larch of thirty years' growth, thinned three times (say, in ten, fifteen, and twenty years) with 300 of the best trees remaining, is worth at present prices 30*l.* per acre; the thinnings realise from 10*l.* to 13*l.* per acre, and pay for fencing, draining, planting, and cleaning the plantations. In the bottom of the glens, whither the soils from the adjoining heights gravitate, oak, ash, elm, and sycamore develop into large timber trees, if allowed to occupy the ground for sixty or seventy years, and yield an income of 30*s.* per acre per annum.

The demand for timber for the collieries is large and increasing. The imports to the port of Cardiff alone in 1882 were 226,175 tons of pit-wood and sleepers, and 71,928 tons of deals and deal ends. The local supply is insignificant. With such a demand for timber, it seems strange that landowners do not plant more of their mountain land; its agricultural value would be doubled, and in many instances trebled. The pastoral land would also be greatly enhanced in value

by the shelter of plantations. The returns from planting are slow, but sure and remunerative. The person who plants seldom reaps the full fruit of his labours, but the value of his estate is gradually and permanently increased for the benefit of his successors.

GENERAL REMARKS.

It has, I believe, been shown that the arable farming of the Vale of Glamorgan, though generally prosecuted with skill, a fair amount of capital, and all the most modern appliances, has of late years been very unremunerative. The returns from corn-growing have been disappointing and unsatisfactory. Foreign competition has seriously reduced the price of all cereals, and inclement seasons have reduced their yield. It is suggested that one-third of the arable land, and especially that which is heavy and difficult to work, should be laid down to permanent pasture. It is also suggested that the rents of arable land should be reduced to meet the emergencies of the times. This is being done. It is further suggested that wet land should be drained, and that farm-buildings and cottages should be made fully adequate for the requirements of the respective holdings. The Railway and Dock Returns prove that South Wales is at the present time more prosperous than any portion of the United Kingdom, and landlords must feel that the commercial industries of the country tend to increase the value of their property; and that if they can assist their tenants to tide over a period of agricultural depression, the result must in the end be to their own advantage.

It has been shown that the tenants of the small farms of the hill districts have of late years been more prosperous than the larger farmers of the arable districts, but this affords no valid argument for small farms to be preferred to large ones. The reason is simply apparent, that foreign competition has not as yet seriously affected the value of home-grown beef and mutton. Some people predict that the future importations of American beef, and New Zealand and River Plate mutton, will as seriously affect the grazing districts of this country as foreign corn has done that of the arable districts. There is, however, no immediate prospect of this being realised. If the home herds and flocks can be kept free from imported diseases, there is every probability that home supplies of beef and mutton will cope for some considerable time with the foreign importation of these articles. The efforts of the British farmer must continue to be directed to improved breeds of stock, to early maturity, and economical feeding and management. The present are doubtless transition times in English farming, and there must be

some departures from old rules. Our imports are pointed out with a significance that farmers generally are on the wrong tack. England imported in 1882:—

Butter, costing	.. .. .	£11,350,909
Cheese	„	7,749,870
Eggs	„	2,385,263
Poultry and game	.. .. .	501,008
Pork (salted and fresh)	.. .. .	583,797
Bacon and hams	.. .. .	7,772,063

Agriculturists are reminded that nearly all farms can produce the above commodities in a greater or less degree, and that more attention must be paid to them if British agriculture is to accommodate itself to the wants of the million.

With all the disadvantages of having a very large area of inferior soils and a moist and fickle climate, there are great incentives to further agricultural improvement in Glamorganshire.

It may be noted that I have hitherto omitted any, or made little reference to, bare fallows, although they occupy about 3000 acres in the county. In the Vale of Glamorgan they do not occupy any considerable area, and they are chiefly confined to the heavy undrained clay soils which I have recommended should be laid down to permanent pasture. In the hill districts, when isolated fields are broken up and cropped, they are commonly subjected to a year's bare fallow. They could, as a rule, be much more profitably cropped with roots, but the farmers of the hill districts have not taken kindly to turnip growing. This may be considered one of the weakest points in their management. The fallowing and liming of medium land is a relic of bygone days, which is still too much adhered to. Should root-growing ever become general in the hill districts, even on a limited scale, it would be safe to predict that a vast improvement in the character of the live-stock of many farms would be the result.

APPENDIX.

The Agricultural Returns for 1884, just to hand since writing the above, do not materially alter the conclusions arrived at with respect to the county. There is an increase, as compared with 1883, of 272 horses, 3202 cattle, and 13,420 sheep; but there is at the same time an increase in the area of permanent pasture of close on 5000 acres. From my own personal knowledge of the county, I am convinced that the increase in sheep is chiefly in the hill districts. Respecting the increase in cattle

it is believed to be more general over the whole county. A large number of calves have been reared by nearly all classes of farmers during the last two years.

VII.—*Report on an Outbreak of Abortion and Premature Birth in the Ewe-Flocks of Lincolnshire during the Winter and Spring of 1883.* By J. WORTLEY AXE, Professor of Pathology, &c., at the Royal Veterinary College.

THIS Report has reference to the prevalence of abortion and premature birth, as stated above.

The outbreak in question was first brought to the notice of the Lincolnshire Agricultural Society by several of its members who had suffered serious losses of lambs and ewes, both before and during the lambing season. Acting upon the information communicated to the Society, a resolution was passed, "That in consequence of the loss suffered by farmers from abortion amongst ewes, the Royal Agricultural Society be asked to send down some competent person, and advise thereon." This was subsequently brought before the Royal Agricultural Society, and at their request I was instructed to make enquiry into the subject, and report the result to the Veterinary Committee.

In order to become fully acquainted with the circumstances of the outbreak, it was deemed advisable that I should visit the more seriously affected centres, which were said to be in the neighbourhood of Lincoln, Caistor, Louth, and Brigg. At the same time a series of questions * was drawn up, and freely dis-

* **QUESTIONS.** (If your flock has been free from abortion or premature birth, answer Questions 1, 2, 3, 4, 5, 7, 8, 9, 10, 11.)

1. State if the land over which your ewes have run, since September last, is high or low.
2. Describe the nature of the soil and sub-soil.
3. State (A) what number of ewes you put to the ram, (B) their breed, (C) their age.
4. When were they put to the ram?
5. On what kind of food were they tugged?
6. Did they suffer from any disease such as foot-rot, liver-rot, foot-and-mouth-disease, &c., immediately prior to or after leaving the tup? and, if so, to what extent?
7. Describe fully the winter feed of the past season, and state if it has been in accordance with your custom of former years.
8. Mention the kind of manure employed for your turnip crop.
9. Did your turnips continue sound through the winter?
10. If on roots, state if your ewes "eat their way," or followed other sheep.
11. What percentage of your ewes were barren?
12. Has abortion or premature birth prevailed in your flock during the past season?
13. When did it first appear?

[14.]

tributed among the principal sheep-farmers throughout the county: not only those who had, but likewise those who had not suffered by the affection. The object in seeking information from these two sources was with a view to comparing the results of different systems of management of the ewe flock, as practised by different flockmasters, and to determine, if possible, whether the disorder had its origin in a common or specific virulent cause.

The general conclusions arrived at in the course of the investigation were made known in a preliminary report, addressed to the Lincolnshire Agricultural Society, in September last.

In the present Report it is proposed to give a detailed account of the enquiry, with a view to show the basis on which those conclusions have been arrived at. The investigation extended to over 200 flocks; but, owing to the questions submitted having been altogether disregarded by some, and insufficiently or indefinitely answered by others, the available replies were reduced to 106; these having reference to a total of 51,475 ewes.

In the course of the enquiry it soon became evident that the cause of the disease, whatever it might be, was operative throughout the entire county. On the High Wolds and Cliff range of Heath Hills, as well as on the low fens and marshes; on the lightest and freest, as well as on the heaviest and stiffest of soils; and on the porous sand and impervious clay, with all their intermediate forms of combination.

With a view to acquiring a general idea of the area and extent to which the malady prevailed throughout the country,

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14. How many cases have occurred?
 15. Did the disease prevail equally in the early and late season ewes?
 16. State in what week or fortnight your greatest losses were experienced?
 17. Over what period did the outbreak extend?
 18. How many ewes have died or been destroyed on account of this disease?
 19. Was the disease more prevalent (A) amongst ewes with pairs, or singles?
(B) amongst young ewes or old ones?
 20. What was the state of the lambs when cast?
 21. At about what period of pregnancy did the mishap occur?
 22. Has your flock been exposed to any of the following causes, viz., fright, severe exertion, long fasting, offensive odours, injury, or ergotized grasses?
 23. Were roots supplied to your cattle from the same stock as those supplied to your sheep?
 24. Has abortion or premature birth occurred in your cows, or other animals on the farm?
 25. Mention the kind and daily allowance of manger food which your hogs have received besides roots?
 26. Has any disease prevailed in your oxen, fatting sheep, or hogs during the past season, and, if so, of what nature?
 27. To what extent has abortion prevailed in your sheep, during the five seasons previous to the one just passed?
 28. Do you consider the disease contagious, and, if so, state your reasons for so thinking?
 29. State your opinion of the origin of the disease.

letters of enquiry were forwarded to a large number of veterinary surgeons in different counties, and I personally interviewed all, or nearly all, the shepherds attending exhibits at the Smithfield Club Show.

From returns made by the former and information gained from the latter, the inference may be drawn that, although abortion and premature birth in ewes were more or less general throughout the country, there was no corresponding prevalence of the affection to that which occurred in Lincolnshire. The losses experienced in this county, however, were not solely confined to the two forms of mishap above referred to.

A third group of cases occasioning considerable mortality comprised ewes at their full time, which either gave birth to lambs recently dead, or so weakly and ill-nourished as to die shortly after birth; the ewes themselves either dying from exhaustion, or continuing for some time after parturition in a state of extreme prostration and weakness.

The first appearance of the outbreak dates from the latter part of the month of December, when isolated cases only occurred here and there. As the season advanced, the disorder became more and more general until the middle of February. From this time to the middle of March the mortality reached its highest point, subsiding gradually towards the end of the lambing season. The subsidence of the malady at this time is spoken to by some as occurring about the time when the weather became frosty, and the lair drier and firmer.

The onset, symptoms, and course of the disease varied in different cases. In some, abortion was preceded by a marked falling-off in condition, extending over seven to twenty-one days. In these cases there was a growing state of weakness. The fleece lost its lustre, and became staring and hard to the touch. The eyelids drooped, and the face wore an expression of dulness and want of life. The appetite, at first fastidious, became more and more indifferent, and ultimately food was altogether refused.

During this time the animal isolated itself from the flock, the sides of the body fell in and lost their characteristic roundness; while the belly, increasing in depth, hung in a lax, pendulous condition, as if having lost its support.

Sooner or later straining was superadded; but, owing to loss of muscular energy, the throes were feeble and ill-sustained.

A reddish black stinking discharge issued from the vagina, and with it a small dark putrid foetus sometimes escaped. With the increasing prostration there was inability to rise, palpitation of the heart, and a quick shallow breathing. The head was thrown from side to side, and the teeth were forcibly "ground."

In such examples extreme prostration usually resulted in exhaustion and death.

In other instances, the general indications of ill-health were but slightly marked. Languid movements, indifference to food, and slight dulness, were the premonitory signs, followed by straining, which might continue for one, two, or three days, attended or not with a discharge of fetid fluid.

In the latter case a dead putrid lamb was sooner or later discharged, followed, or in some cases preceded, by a second, either alive or but recently dead. When the lamb was born alive it was mostly small and badly nourished, and soon succumbed to premature exposure and want of development.

A marked excess of cases occurred in the younger portion of the flocks, and the same may be said of the "early season" as compared with the "late season" ewes. Ewes tugged on turnips suffered more than those run on clover lair or old pasture.

Of the 51,475 ewes comprised in this enquiry, 6234, or about 12 per cent., aborted, and 1494 died.

In estimating the relative frequency of abortion in ewes with pairs as compared with singles, it was found that the losses predominated in the former in the ratio of 31 to 5.

This fact is of considerable importance, inasmuch as it points to the existence of some debilitating cause unfitting the ewes with twins to meet the greater demands on their nutritive resources, while influencing in a less degree those with singles.

As to the existence of abortion in cattle, information was also canvassed. The replies that I received on this head clearly show that no concurrent epizootic prevailed in the yards, notwithstanding that roots from the same stock as those supplied to ewes and hoggets were, in the instances where cattle were kept, also consumed by cows. In four returns out of the one hundred and six, abortion is said to have occurred in cattle on three farms, but only to an inconsiderable extent so far as two of them were concerned: and in the case of the third, it appeared to have arisen some time antecedent to the outbreak referred to in this Report. From these considerations, together with the further fact that roots were largely consumed by feeding sheep, it does not appear that they possessed any special deleterious quality. Speaking of the root-crops generally, they are said to have been exceptionally abundant, and uniformly free from disease and decay; but, owing to the mildness of the winter, they continued to grow, and remained throughout the season in an unripe and watery condition. This state of the root-crops has been referred to again and again by experienced farmers as a potent factor in the production of the disorder, and there is every reason to believe that such was the case.

In endeavouring to make clear the causes giving rise to this outbreak, attention was specially directed to the following heads :—1. The inception and progress of the disorder ; 2. The physical and geological character of the soil ; 3. The general health of the flock antecedent to the outbreak ; 4. The nature of the manurial dressings employed in turnip culture ; 5. The system of feeding and general management of the flock.

As regards the inception and progress of the disease, and the relations of the physical and geological character of the soil to the prevalence of the epizootic, there is nothing further to add to that which has already been stated. Of the general health of the ewe flock before the outbreak of abortion, the returns render a fairly satisfactory account in every respect, save and except as regards "foot-rot," "mud-rash," and "carbunculous disease of the feet and legs." In reference to the former affection, it is reported to have existed to a considerable extent during the autumn, and to have become seriously aggravated by the bad state of the ground and heavy rains which prevailed throughout the winter. Of the one hundred and six flocks already referred to, this disease prevailed to a greater or less extent in forty-five, comprising a total of 21,600 ewes.

Of this number, 7800 lived exclusively on roots, the remaining 13,800 having besides either grass, corn, cake, or some other nutritive food. Of the 7800 confined to turnips, 22 per cent. aborted ; and of the 13,800 receiving more substantial aliment, only 6 per cent. were so affected. Comparison with the result of calculations, presently to be noticed, gives a clear charge against "foot-rot," in this connection alone, to the extent of $4\frac{1}{4}$ per cent. From these considerations it results that whatever may have been the essential cause in operation to produce the malady, "foot-rot" must be regarded as an important determining influence, if not, in some instances at least, the actual cause of the affection. That animals should give up the fruits of conception when tortured by the pain and suffering which extensive and unprotected ulcers of the feet necessarily entails, is no matter for surprise ; and especially when, as in the present case, they are worn down by exposure, fatigue, and the pernicious influence of a cold and ungenerous diet. "Mud-rash," or inflammation of the skin of the legs and belly, I am informed, caused much suffering. In the worst cases, the legs were swollen and denuded of wool, and not unfrequently excoriation and ulceration of the skin existed over a large surface. A similar condition, in some instances, extended along the under surface of the belly and over the internal aspect of the arms and thighs. Ewes, following closely folded hogs, on deep, strong, retentive land, fared badly.

Here the soil was worked up into a veritable puddle, or, what is worse, an impassable slough, rendering the recumbent posture all but impossible; and the poor beasts, with their heavy burden of young, stood in mud over their hocks and knees for many successive days, and some are stated to have "got down in the dirt and were obliged to be killed," in the last stage of exhaustion.

Of the many interesting features of this investigation, that which deals with the relations of manurial dressings to the disease under consideration is certainly not the least important and instructive. For many years past there has been a growing feeling of uncertainty among farmers as to the wholesomeness of roots grown under the forcing influence of large quantities of artificial manure, and in many sheep-breeding districts this has led to a more rational and better system of feeding in the judicious apportionment of turnips, and the allowance of a fair daily ration of corn, cake, and other nutritive aliment.

Having regard to the importance of the subject, I availed myself of the opportunity afforded by this enquiry for obtaining precise and reliable data, and so far as the evidence of an isolated experience can be relied upon, the prevailing suspicion concerning the use of artificial manure in connection with the health of sheep, would seem to be in some respects justified.

From an analysis of the information received on this head, it results that:—

Under the use of mineral superphosphate ..	18½ per cent. aborted.	:
" " bone superphosphate ..	18	" "
" " farmyard-manure ..	11	" "
" " bones	8	" "

It will thus be seen that bone and mineral superphosphate, which form the basis of most of our best fertilising compounds, are here identified with the greater losses. It must not, however, be concluded that this result is necessarily due to the direct action of the superphosphates themselves on the organism of the sheep. It may be that such is not the case, and indeed it seems to me that the evil effects of the roots will be found to refer to want of maturity, and consequent inferior nutritive value, the result of forced growth, rather than to any actual deleterious principle elaborated within them.

The high-pressure system of forcing the growth of roots by the free application of artificial manure, and the growing practice of sowing late and stocking early, in pursuance of a rotation of close and continuous cropping, and to meet the exigencies of seasonal conditions, are inconsistent with full maturation and ripening, and consequently with the development of those high nutritive qualities on which the salubrity and value of roots

depend. With these considerations in view, the desirability of a guarded and judicious employment of this description of food in the management of breeding-stock cannot be too forcibly insisted upon, for, as I shall show, it is in the abuse of such roots that danger resides, and not, as has just been pointed out, in the presence of any special element of a pernicious nature. That this is so, is shown by the fact that, notwithstanding the untoward results which befel the ewes, the hogs which immediately preceded them, and fed from the same crop, were entirely free from disease in almost every flock to which this enquiry refers.

If proof were wanting of the hurtful influence of that too common system which condemns pregnant ewes to live exclusively on filth-laden shells, or cold innutritious roots, it is found in the facts and circumstances of the outbreak in question.

In dealing with this part of the subject it will be convenient to divide the several modes of feeding described in the returns into three classes; viz.: 1. In which roots alone were employed; 2. In which roots were supplemented by frequent changes to grass; 3. In which roots were supplemented by corn and cake, or some other substantial aliment.

In Class 1, I find that of the total number of ewes so fed, 19 per cent. aborted. In Class 2, 3 per cent. In Class 3, $1\frac{1}{2}$ per cent.

A similar kind of testimony is adduced in more than one instance where particular flocks were divided into two parts; one receiving dry food in conjunction with roots, while the other subsisted on roots alone. In the former, the ewes are stated to have carried their offspring through the full period of gestation, while many of the latter aborted. Similar examples of the saving influence of manger food were found where old broken-mouthed ewes were allowed to "go forward" with the hogs, and share in their better feed. To the injurious influences already pointed out may also be added the prevalence of easterly and north-easterly winds, and drenching rains, for many successive days and nights, when, as was stated by many of my correspondents, "the ewes, the ground, and the turnips were sodden with moisture," during the most critical period of pregnancy. At this time, the ground became waterlogged, and many of the ewes with their burden of young within, and the fleece laden with soil and water without, fell with fatigue while moving through the deep holding ground in search of food. It was stated again and again that when, through sheer necessity, the flock was removed on to pasture offering a tolerable lair, such was their state of fatigue, that they continued to lie down for

many consecutive hours, and required to be lifted up before they could be got to the troughs.

From a full consideration of the foregoing facts and circumstances, I have arrived at the conclusion that the outbreak of abortion referred to in this Report was not produced by any special and particular cause ; but that it is to be referred to the concurrent operation of several hurtful influences of a common character.

First and foremost stands the mischievous and fatal practice of feeding pregnant ewes exclusively on unripe watery roots, and especially on unwholesome filth-laden shells.

Secondly.—Pain and suffering caused by protracted “foot-rot.”

Thirdly.—Exposure to cold winds and heavy continuous rains.

Fourthly.—Fatigue arising out of the deep and sticky state of the ground.

Recommendations.—The above circumstances being taken into account, I have to submit the following recommendations:—

1. That from the time ewes are placed on turnips to the time when they lamb down, they should receive a liberal amount of dry food, to be regulated according to the nature of the season and the condition of the roots.

2. The quantity of roots should at all times be limited, and besides shells, a fresh break should be given every day after the hoar-frost has disappeared, and in the early spring the tops should be removed.

3. Change from the fold to the open pasture twice or thrice a week, or for a few hours each day, if convenient, is desirable, and especially when the lair is bad.

4. Protection from cold winds and driving rains should be provided in stormy weather.

5. Plenty of trough room should be provided, and ample space allowed for the ewes to fall back.

6. All troughs should be shifted daily, and set well apart.

7. Dry food should be given at the same time as the fresh break of roots, to prevent crowding at the troughs.

8. Rock-salt should be at all times accessible.

9. Animals suffering from “foot-rot,” or other forms of lameness, should be removed from the fold, and placed on dry litter, and receive such other attention as the nature of the case may indicate.

VIII.—*Anæmia in Sheep, known also by the terms “Wasting,” “Hunger Rot,” “Blood Rot,” &c.* By Professor ROBERTSON, Principal of the Royal Veterinary College.

THIS affection is deserving of more consideration than has hitherto been bestowed upon it, considering its very extensive, probably universal, distribution wherever sheep are kept, together with the considerable yearly losses, which I believe might with proper dieting be greatly lessened. The disease is not confined to any particular breed or age of sheep, nor to any limited district of Great Britain; while it is recognised as a disturbing factor in the calculations of stock-owners over extensive territories in the Western States of the New World. It appears as one of those diseases of the assimilatory system generally, which within late years have been brought more prominently under our notice through the very considerable changes in stock management which have marked the progress of modern agriculture.

No doubt certain breeds and particular classes of sheep seem greater sufferers than others, while in certain districts the disease is more constantly observed than in others. Of the different classes, young sheep, “hoggetts,” both fattening and store animals, and breeding-ewes furnish the greater number of victims. The explanation of the frequency of its appearance in these classes and over particular localities is usually not difficult, and is understood by reference to the influence of dietetic causes chiefly.

Definition of the Terms.—*Anæmia* is employed to indicate that diseased state in which there is deficiency in amount of the circulating blood, local or general; it also includes deficiency of certain of the essential constituent-elements of the blood, particularly of the formed elements, the globules, and of the albuminous. From the obvious physical changes, the blanched and attenuated state of the muscular structures, with the deficiency in amount and altered character of the blood, as well as some other local features exhibited during life common to this and the parasitic liver-disease known as “rot,” the names of “*blood rot*” and “*hunger rot*” have come to be employed. The definition given of the term *anæmia* is purely conventional, while the condition thus expressed exhibits itself under many varieties. We may conceive of a simple deficiency in volume of the circulating blood; such, however, rarely or never occurs alone, for with the reduction in amount there is alteration in the relative amount of several of the essential constituent-materials.

Varieties and Nature of Anæmia.—The most commonly encountered manifestations of *anæmia* are those where, in addition

to the lessening of the entire volume of the blood, there is deficiency of the red-blood globules and of the essential colouring material, together with certain unnatural conditions in the plasma, or liquid material.

Water may be in excess, or the proportion of the albuminous constituents or of the salts may be diminished. It is chiefly to the lessening in amount of these two main elements of the blood, the formed or the globules, and the plastic or albuminous, that the serious consequences of anæmia are traceable. Every vital function being dependent for its maintenance upon the due supply and interchange of oxygen in the body, any deficiency of the red-blood globules cannot long exist without extensively distributed and serious interference with every animal function. Every nutritive and secretory action becomes more or less interfered with. Growth, development, stability of tissue, and dynamic action are impaired. Respiration and circulation are disturbed, while the entire phenomena connected with digestion and assimilation are perverted ; producing, as the result, a steady increase of the blood contamination from imperfect oxidation, and the production of unnatural and noxious materials or compounds. Whether occurring from want or waste, the absence from the blood of the albuminous compounds so often found in anæmia cannot long exist alone. Upon their existence in correct proportion in the blood depends, not merely the opportunity of nourishment being afforded to the several extra-vascular tissues, but also to the oxidizing agents themselves, the red globules. With deficiency of the albumens these latter will not long remain in a healthy condition or proportion. Being dependent for their life and development on the support derived from the albumens, an absence of these is shortly followed by changes in the formed materials, and a state of aglobulism is added to that of a deficiency of the albumens.

Causation.—Various and somewhat different agencies are found to operate in the production of anæmia as a diseased condition, the chief of these being a deficient supply of blood or of blood-forming materials, excessive waste of these, or a combination of both classes of factors. With sheep, there is rarely any specially noted disease of such organs as are particularly concerned in the manufacture or distribution of blood, as the lymphatic or blood-glands, or the various conduits by which it is conveyed in its course through the body ; neither does the serious disturbance seem to be attached to such general unhealthy states as are recognised in tuberculosis, or allied conditions representing abnormal formative processes. The greater number of the cases are what may be designated primary anæmia, where all that may be asserted is that there exists a want of relative balance between

the requirements of the system and the nutriment supplied. The food-supply may be in a certain sense abundant, but on examination it will ultimately be found inadequately provided with materials fitted for the manufacture of healthy blood. In all cases of its appearance the disturbed relations or non-fulfilment of conditions essential to the maintenance of healthy animal life seem to exist in the province of diet. In no instance have I encountered anæmia where the diet has been of a mixed character; and in every extensive outbreak the food-material, whatever it was or in whatever quantity allowed, has been characterised by one feature—sameness. While restoration to health in those animals in which exhaustion had not proceeded to an extreme point was invariably attendant on a change of diet, or on an addition to the existing one of some other material—this in certain cases not apparently greatly excelling the original in what are regarded as qualities of nutrition.

Although probably of less frequent occurrence everywhere during the summer, the different seasons of the year do not appear to influence its production to an extent at all comparable with varieties of soil. This we can with little difficulty understand, when we consider that, much as meteorological conditions influence the character and healthy development of plants which form the food-supply of animals, the geological formation of a soil, and its manurial poverty or richness upon which these plants so largely depend for their support, must of necessity exercise an influence infinitely greater.

When met with during the summer amongst sheep on pastures, it will generally be encountered first on such lands as are of a weak, moory character, and which in all probability have been lately undergoing considerable alteration from cultivation, and under conditions where the animals have been retained upon this kind of soil for exceptionally long periods without change; conditions which, whenever occurring, are exceedingly liable to produce a variety of serious diseases amongst sheep. Second, on meadow or old-grass pastures which have been extensively irrigated, or where, owing to an exceptionally moist season, an extra crop of rank immature herbage has been the natural result.

By far the most serious manifestations of anæmia in this country, however, are to be looked for during the winter and spring. First, when sheep are folded and fed exclusively upon turnips grown on weak moory land, particularly if this has been lately reclaimed; secondly, when sheep, being deteriorated in health from their summer feeding on rank meadow or other grasses, are placed for winter keep on root-crops alone, hay as well as corn and cake being withheld; thirdly, amongst breeding-

ewes at the period of lambing, when these have been kept and fed pretty closely upon winter-grown grass on lands in rich manurial condition. Under such conditions it may occur in any breed and amongst all ages. I have, however, observed it more frequently in young feeding-sheep and breeding-ewes than amongst other classes. It seems more liable to declare itself during seasons when the roots—turnips—are abundant, and when every inducement exists to give these alone and in unlimited quantities.

Although it is a tolerably well-ascertained fact that sheep, particularly when young, are pretty certain, if confined for a lengthened period to feeding upon turnips grown on the class of lands already indicated, to be large sufferers from anæmia, it is at the same time deserving of notice that a similar anæmic condition does occasionally present itself in the same class of animals when feeding upon turnips grown upon lands of a very different and superior character—in fact, upon any or every kind of soil. Under these latter conditions I have, however, observed a marked tendency, in all fatal cases which have been examined, to structural alterations in the liver, a condition which may be said uniformly to exist in ewes feeding upon fresh and actually growing winter grass, where the same anæmic state reaches its crisis at the period of lambing. Neither of these articles of food grown upon any land, even the best, are well calculated to furnish material for the elaboration of healthy blood or other animal tissue. Not only is the amount of water that these contain excessive, but the relation in which this stands to the other and truly nutritious materials is such as to alter the otherwise useful appropriation of these latter by either growing or fattening animals. Turnips may be very useful feeding-material when used in conjunction with others calculated to yield the various forms of albumen so essential for healthy animal nutrition, but they are comparatively worthless, or worse, when employed alone to maintain sheep in healthy and vigorous existence. And no more reckless or extravagant expenditure in dieting exists, than when in years of plentiful crops of these, either breeding- or feeding-sheep are kept exclusively on them. Not only is their feeding-value—which ought to be rated merely as an auxiliary agent—thrown away, but there is entailed upon the animals either actual disease, or a marked susceptibility to many and different disorders. The fact that exclusive feeding upon roots, even when these are of a superior character, has generally been most disappointing, particularly as respects preparing young sheep for the butcher, has long been noticed by the observant. The result has been attempted to be explained in most ways rather than by the correct one. The

disappointment and shortcoming has usually been most conspicuous when the crop have been an abundant one, and when the season has been favourable, so that little damage to the roots has been sustained from frost; when, in fact, all conditions seemed most favourable. The reason why the liberal or unrestricted use of these—generally swedish turnips—has been so unsatisfactory must be looked for not in the roots themselves, but in the fact that they were not supplemented by materials of a somewhat different character.

Although the exclusive feeding upon roots grown on any land will induce anæmia, it is deserving of notice that such is more marked when they are the produce of certain soils. All that class of lands recognised as light or moory are noted as yielding roots unsuitable for sheep-feeding.

From the same cause (its low nutritive value), luxuriant autumn-grown grass is found to operate detrimentally upon breeding ewes, when these are confined to it during the middle or most critical period of gestation. Grass, although apparently luxuriant and in full quantity in October, is not the same in character as in June or July.

Amongst this latter class of stock the unnatural condition of anæmia develops itself in a slightly different manner from that which is observed in the former. Amongst breeding-ewes serious consequences seldom occur, and even suspicions of danger may not be entertained until the period of lambing. The tax at this period upon the vital power and energy of the animal is too much for the system to withstand or overcome, and fatal exhaustion rapidly sets in. The time required for the full development of these adverse dietetic conditions in the production of the unmistakeable symptoms of anæmia is somewhat variable. With young sheep which become affected while feeding upon turnips, a few months of tolerably close confinement to them, particularly when they are grown upon weak or moor land, is sufficient to produce undoubted evidence of the disturbance, and, when not attended to, it will in many cases terminate fatally. Amongst ewes, again, in which more decided textural changes in the liver structure may be observed, and in which the fatal termination is reached at parturition, I am inclined to believe that it requires more than one season's exposure to the influences of those peculiarities of diet which have been indicated as productive of the disturbance, before fatal results in large numbers are likely to ensue. Before this fatal result is reached, however, it may generally be anticipated; the most unmistakeable evidence being obtained during the previous lambing season. The ewes at this time, or even antecedent to it, show a want of vigour, and after the accomplishment

of the act require a much longer period than is ordinarily needed by perfectly healthy animals for the establishment of normal functional activity. Coincidentally with this lowering of vital power in the ewes, a similar want of natural vigour and stamina is observable in the lambs. These may be full-sized, but they want vigour; their entire system seems to be deficient in tone and healthy development, and they are more amenable to any adverse influences which may be encountered.

Although it is abundantly clear, both from extended clinical observation and special experimentation, that errors in diet, resulting in an absence of healthy tissue-forming elements in the food received, are the great or only inducing factors in the production of anæmia, it is not always easy to demonstrate the nature of this want, nor yet its mode of operation in the production of the varied phenomena observed during life or on examination after death. The most obvious defect in these deleterious diets is a deficiency of the albuminous agents. This want, actual or relative as compared with some other scale or system, may seem inadequate to account for the very serious results which follow its continuous employment, and is not always clearly brought out by any examination, chemical or physical, of either grass or roots serving as food, or of the soil from which these are produced. Still there seems no doubt that upon this comparatively trifling difference in the food-materials of an excess of moisture, and a lessening of the percentage of flesh-forming constituents; and in the soil of a want of salines, or in some instances of an excess of mineral salts, may depend the imperfect manufacture and want of tissue-formative power of that upon which all structures depend for sustenance and life, the blood.

Anatomical Characters or after-death Appearances.—The diseased conditions observable in an ordinary examination of cases of anæmia which terminate fatally are neither numerous nor variable. The most obvious are in association with the soft or liquid tissues, chiefly in the muscular and circulatory systems. With the former of these the main features are a deficiency of bulk, consistence or firmness, and of colour; this wasting, although most observable in the voluntary muscles, is not entirely confined to these,—the great mass of the involuntary muscular tissue forming the alimentary tube occasionally exhibiting like characters. With this general atrophy of elemental structure we have an evident disposition to interference with growth and functional activity concomitant with, and resulting in, degenerative changes. In this way we account for fatty metamorphoses connected with the internal organs, as the heart, kidneys, and liver. This degenerative action, or replacement of tissue-elements by those of a lower grade, is usually well marked

in ewes which fall victims to anæmia. The nervous centres, particularly the brain, are generally softer than is natural, and in a condition not inaptly characterised as "moist," there being a greater amount of fluid in connection with them than is found in the same animals when in the enjoyment of perfect health. These organs do not appear to be extra-vascular, nor does the extra fluid seem the result of inflammatory action, as has been supposed. The intestinal canal is frequently attenuated in its walls, and when diarrhœa has occurred previous to death, patchy inflammation may be exhibited, with blood extravasations from the minute vessels of the sub-mucous structures. In the circulatory system, however, we meet with the most characteristic symptoms of the condition. In nearly every case any ordinary observer would be struck with the general pallor and want of blood in every part of the body. The large veins, which are ordinarily full, when cut, scarcely yield as much blood as will suffice to wash the hands, while the physical characters of colour and consistence of the blood have been obviously changed. Its specific gravity has been lessened, and its power of forming coagula diminished or absent altogether. In the latter condition, instead of forming a consistent clot, it is disposed to settle into layers of red corpuscles, white corpuscles, and plasma. In other instances the colouring material has been so altered as respects its connection with the coloured globules, that, having left these, it has become distributed through the plasma, giving a transparency to the entire mass, and possessing the property of staining tissues.

Symptoms.—In all extensive manifestations of anæmia occurring amongst sheep, the earliest symptoms are apt to be overlooked or disregarded, more particularly if previous experience has not sharpened observation and induced the observer to regard with suspicion the conditions under which the animals are placed. The suspicion at first entertained that the sheep are not thriving or laying on flesh as rapidly as they ought to do, is speedily changed to the conviction that there is something seriously wrong with them. At first there is nothing to cause anxiety, and the death-rate is only an average one; in a few weeks, however, with unaltered conditions, the mortality will increase, or it may become alarming.

On carefully examining a stock in which anæmia is insidiously but steadily affecting their health, a considerable number of animals will be observed to be unnaturally dry-looking in their wool and tucked up in their bellies; the amount of food consumed will be found to be less than ought to have been eaten; and, when handled, the wool will be found hard, and wanting in the usual mellow feeling it ought to possess. The

skin will not move so freely on the subcutaneous tissues, the animals feeling "hard," as the expression is, and the conviction will be forced upon the examiner that they are losing instead of gaining flesh. Those upon which the adverse conditions have produced effects earlier or more severe, will be observed as wanting energy and vivacity,—moving after their fellows listlessly and with an absence of will,—seeming rather disposed to be at rest, and evidently unfit for any considerable exertion. The condition of the digestive organs of many may also attract attention; some—the greater number—will be constipated in the bowels, others will be suffering from diarrhoea; but in all probability neither of these conditions amongst those severely affected will be of long continuance, as they are apt to alternate. Examined individually, the ordinary symptoms of anæmia are, as a rule, well marked; the heart's action is rapid but weak; the state of the visible mucous membranes, as seen in the mouth, eyes, and upper air-passage, is pale and bloodless, and the entire muscular system exhibits want of power and tonicity, with loss of bulk and rotundity; while in some cases of a severe form or of long standing, one may notice in the inferior parts of the body, chest, and neck, patches of soft watery swellings, the result of effusion amongst the connective tissue beneath the skin. In severe and prolonged cases there is generally depravity of appetite, with inability to digest or assimilate the most digestible and nutritious materials; while, in many which terminate fatally, cerebral disturbance, chiefly in the form of coma or stupor, is found to usher in the last stage.

Amongst parturient ewes, in addition to these indications, noted as occurring in other classes of sheep, the earliest diagnostic symptoms, and those most likely to attract attention, are extreme feebleness during the last stage of gestation, together with great prostration and a want of healthy reaction succeeding the accomplishment of the act of parturition. In those cases which terminate fatally, this reaction is never completed, and the prostration is never overcome, but gradually increases, death seeming to result from a deficient supply of blood to the brain, together with failure of the heart's action; both depending upon the altered quantity and quality of the circulating blood.

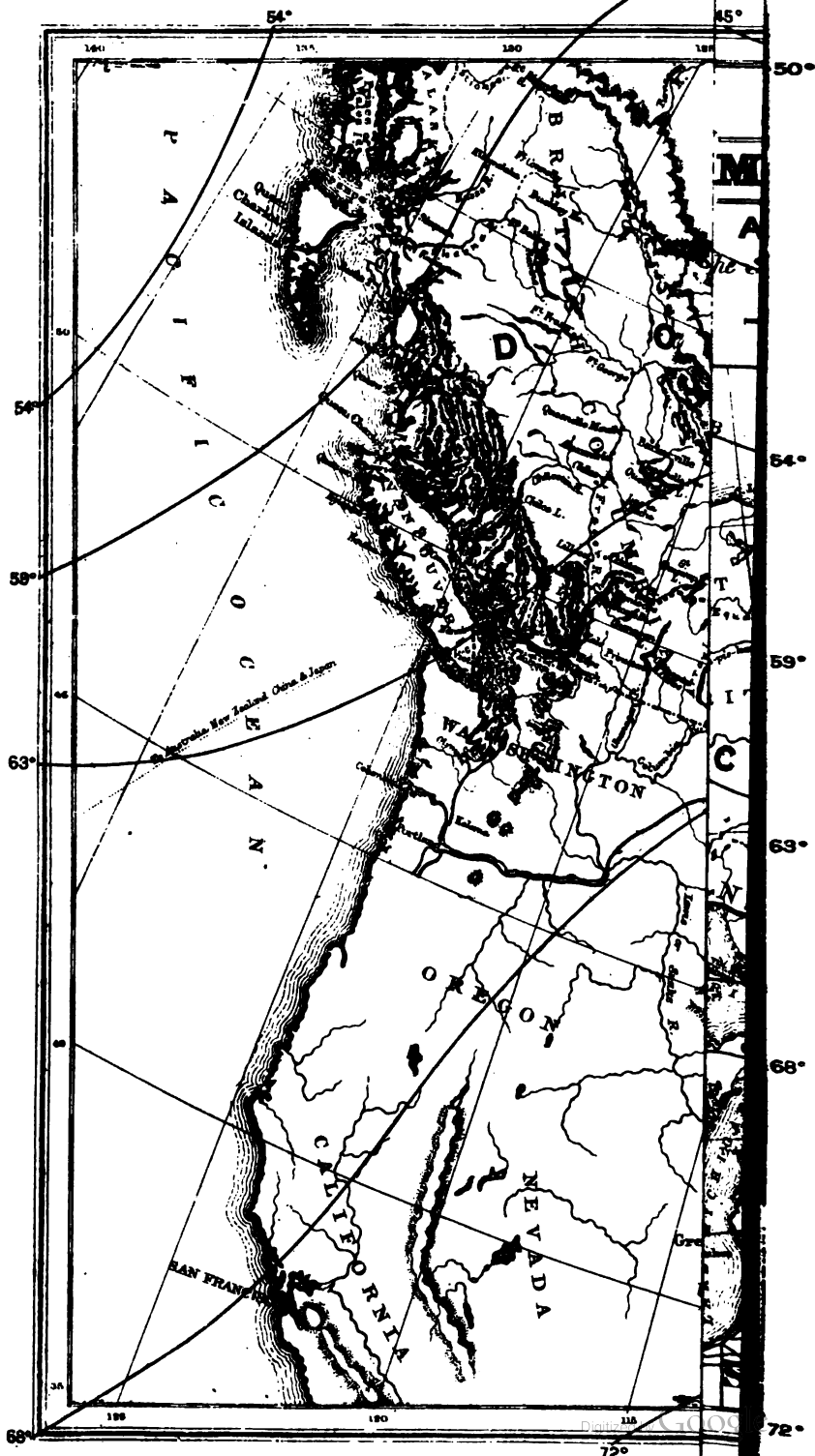
Treatment.—In the management of stock in which anæmia has unequivocally declared itself, the chief indications to be attended to are a correction or change of dietary. Every endeavour must be made to supply the apparent want of the albuminous and tissue-forming elements of the blood. This may be accomplished on the land where the animals are located, by an addition to the roots or grasses upon which they

are feeding, of some easily digested and nutritive material, such as corn or cake; or the animals may be removed to land of a different character, where the natural food is less likely to induce this anæmic condition. In the case of young sheep preparing for the butcher, in which this condition is disposed to develop itself during the spring months, the most readily attainable means of arresting it is at once to remove them from the situations where they have been confined, consuming the roots on the land where they were grown, to some good seeds or young pasture. Even when this latter system is adopted, it will always be found advantageous to give some artificial food. A few oats and bran, or a little linseed-cake, serves the purpose well. In some instances, the addition to these foods of common salt, and some preparation of iron, as the sulphate or carbonate, seems to be attended with good results, particularly when the disease has not made too much progress. In individual cases, a more careful attention to medicinal agents, and the employment of bitter tonics and salines alternated with the iron salts, will produce good results.

Where prevention is the object rather than cure, the same indications relative to diet require to be attended to. With young fattening sheep it is economical in every sense to employ roots only as auxiliary feeding-materials, instead of the sole article of diet. By thus supplying the requisite materials for tissue-growth, we not only attain our end more readily, viz. the rapid fattening of the animals, but we render them less liable to disease. With breeding-ewes many stock-owners are misled, and ultimately suffer much loss from not carefully considering the condition of their dietary during the winter months, and its relations to the health of both mother and offspring. It is no doubt true that, immediately succeeding conception, breeding-ewes may be profitably maintained on a somewhat less full diet than either preceding this period, or during the latter half of gestation. Presuming too much upon this well-known fact of the disposition generally shown to thrive, following conception, the lowering process is frequently carried too far, and injury is done which no amount of after-kindness can counteract. It is succeeding the first half of the period of gestation that particular attention to the regulation of the dietary is called for. At this period the fœtus is of such magnitude, that the demands upon the ewe for an additional supply of nutriment urgently call for a more liberal dietary. This is more particularly the case where these animals have been stimulated at conception so that a large proportion of twins is the result. Neither the full and fresh pastures of our rich arable lands grown during autumn and winter, nor yet an unlimited supply

of roots alone, are proper or sufficient food for pregnant animals. Neither of these are calculated to fulfil the requirements of breeding-ewes at this most critical period, while their exclusive use is certain to show itself most disastrously at the period of lambing, affecting both the mother and progeny. The former are liable through such errors in dieting, not only to suffer from this most fatal affection—anæmia,—with exhaustion and organic disease of the liver, but also from many other disturbances, such as cerebral congestion, fatal bowel-affections, abortion, and rupture of the muscular walls of the abdomen, with others, not less troublesome, confined to the generative organs. The latter chiefly exhibit the deleterious effects of the defective nutrition to which they have been subjected during intra-uterine life, in various manifestations of disturbance in the process of tissue-development. The chief of these is the peculiar arthritic disease of lambs known as “joint ill,” “scholl,” &c.—which sometimes commits such havoc in our sheep-breeding districts; again, dropsy of the abdomen, with destructive changes in the navel cord and liver, frequent accompaniments of the former state; a pernicious form of diarrhœa, and general want of tone and vigour of the whole system.

I am well aware that it seems folly, with so much grass as is frequently to be obtained during mild winters, to think of giving artificial food in any amount, and more so when turnips are plentiful; while, if chemical analysis is resorted to for information, we are told that the winter-grown grass is only inferior to the best July samples, in so far as it contains 10 per cent. more water, the other flesh-forming and heat-producing materials being in no way diminished. Practical experience, however, tells us that the results of feeding upon these two varieties are very different, and that with pregnant animals such foods may not be extensively employed with impunity. We cannot, however, secure the ends desired by merely giving breeding-ewes extra food upon full and luxuriant winter pastures until such have been considerably eaten, because these animals prefer this rank herbage, when they can obtain it, to any other kind of food. It is desirable, and by far the safer system of procedure, that the pastures upon which it is intended to keep breeding-ewes during the middle and later periods of gestation be “run up,” i.e., eaten bare; and that upon these the animals in this condition be allowed a certain amount of mixed chopped hay and straw, with, in special cases, a small proportion of cake or corn with bran—in fact, almost any kind of extra food—so that they shall not be entirely dependent upon, or even permitted to have, an unlimited allowance of fresh grass grown during the winter season on good lands in high



manurial condition. In a similar manner, *i.e.*, used rather as an auxiliary food, it will be found most profitable to employ turnips for the same class of sheep. Instead of giving these roots in unlimited quantities, let them be supplemented with certain less bulky and more nutritious materials. That such treatment, varied somewhat according to circumstances, will be found more conducive to the health of both ewes and lambs, experimentation has abundantly proved, while the appearance of anæmia, with its destructive results developed directly and indirectly in both ewes and lambs, will most surely be reduced to the minimum, or altogether disappear.

IX.—*Canadian Agriculture. Part I.—Prairie Farming.* By Professor W. FREAM, B. Sc. Lond., F.L.S., F.G.S., College of Agriculture, Downton, Salisbury.

THE Dominion of Canada includes the whole of British North America except Newfoundland. By the British North America Act, passed in 1867, the provinces of Upper and Lower Canada (Ontario and Quebec), New Brunswick, and Nova Scotia were united under the title of the "Dominion of Canada," and provision was made in the Act for the admission at any subsequent period of the other provinces and territories of British North America. In 1870, at the close of the Red River Rebellion, the province of Manitoba was formed, and, with the remainder of the vast Hudson's Bay Territory, now called the North-West Territory, was admitted into the Dominion. British Columbia followed in 1871, and Prince Edward Island in 1873. Newfoundland is now the only province not included in the federation.

At the last census, that of 1881, the following figures were obtained :—

PROVINCES.	Area in Square Miles.	Population, 1881.	Increase over 1871.	
			Numerical.	Per cent.
Prince Edward Island	2,133	108,891	14,870	15·8
Nova Scotia	20,907	440,572	52,772	13·6
New Brunswick	27,174	321,293	35,639	12·5
Quebec	188,688	1,859,027	167,511	14·0
Ontario	101,733	1,923,228	302,377	18·6
Manitoba	123,200	65,954	46,959	247·2
British Columbia	341,305	49,459	13,212	36·4
The Territories	2,665,252	56,446	4,446	8·5
Total	3,470,392	4,324,810	637,786	17·3

The square mileage stated is the land area ; adding to this the area of the great lakes and rivers, bays and inlets, 140,000 square miles, there results a total area of over 3,610,000 square miles, which may be compared with the area of Europe, 3,900,000 square miles, and with that of the United States, 2,933,588 square miles, or, including Alaska, 3,510,978 square miles.

Out of the entire population, 403,491 persons, that is, about one-tenth of the total, were owners occupying their own lands. Holders of ten acres or less numbered 75,286. Those who held lands of eleven to 100 acres were 249,997 ; of from 101 to 200 acres the number of holders was 102,243 ; and of more than 200 acres, 36,499.

The area of land occupied in the Dominion in 1881 was 45,358,141 acres, of which 21,899,181 acres were improved, 15,112,284 acres being under crop, 6,385,562 acres in pasture, and 401,335 acres in gardens and orchards.

The latest available figures which show the extent of trade in the Dominion are those of the Trade and Navigation Returns for the fiscal year ending June 30th, 1883. The total imports were valued at 26,450,805*l.*, and the total exports at 19,617,160*l.* The aggregate trade, including imports and exports, was apportioned thus : with Great Britain 19,839,536*l.*, and with the United States 19,540,211*l.*, so that, notwithstanding the close proximity of Canada to the United States, the larger portion of her trade is still with the mother country. Upon the total value of imports the Customs revenue amounted to 4,634,462*l.*, being an average duty of 17·52 per cent., and an average of 22*s.* per head of the population. The exports of the produce of Canada, shipped at Canadian ports, were :—

	£
Produce of the mine	594,177
„ fisheries	1,761,824
„ forest	5,074,145
Animals and their produce	4,056,869
Agricultural products	4,563,704
Manufactures	700,644

The chief items under “ animals and their produce ” were :—

	£
Horses	326,658
Horned cattle	779,605
Sheep	277,611
Swine and their produce	117,794
Butter	341,163
Cheese	1,290,374
Furs	217,505
Hides	92,197
Bacon	87,395
Wool	56,106
Eggs	451,317

The chief items included under "agricultural products" were :—

	£
Barley	1,258,647
Wheat	1,176,298
Flour	503,191
Hay	180,421
Malt	227,340
Potatoes	209,791
Peas	432,342

In addition to the above, wheat, in transit from the Western United States, was exported to the value of 1,164,377l.

As Canada is a young country, with a sparse population widely scattered, her revenue is derived from indirect taxation, there being at present many obstacles in the way of the collection of direct taxes. The inland revenue in the fiscal year ending June 30th, 1883, amounted to 1,375,652l., of which 780,573l. was raised from spirits, 81,005l. from malt, and 377,260l. from tobacco. Of the last-named article, 9,558,952 lb. were manufactured, of which 454,922 lb. were exported. For reasons already stated, and on account of the proximity of the United States, where Protection prevails, a protective tariff is imposed on all, or nearly all, imports into the Dominion; and it is claimed that owing to this "national policy," formulated in 1878, the manufacturing industries of Canada have been very greatly developed. Mr. Patterson, Secretary of the Montreal Board of Trade, in one of his reports, said that "in 1881 the total foreign trade of Canada was larger, in proportion to the population, than that of the United States; while the shipping of Canada, per head of the population, was more than four times as large."

The imports of wheat and bread stuffs from Canada into the United Kingdom during the last ten years, are set forth in the following table :—

	Wheat.	Wheat-meal and Flour.
	Cwts.	Cwts.
1874	3,807,174	389,855
1875	3,604,610	358,766
1876	2,417,151	282,053
1877	2,912,178	254,695
1878	2,603,586	294,448
1879	4,676,686	460,435
1880	3,893,544	521,702
1881	2,860,854	260,342
1882	2,684,828	339,305
1883	1,798,056	469,460

A country that spans the globe from the Atlantic to the

Pacific, whose southernmost point extends as far down as the latitude of Rome, while its northern limits are lost amid the ice-fields of the Arctic seas, and whose area is nearly equal to that of Europe, must necessarily possess many and striking variations in its physical features. And yet, in a few words, it may be said that the eastern part of the Dominion—the provinces of Nova Scotia, New Brunswick, Quebec, and Ontario—is forest; the western portion, British Columbia, is mountain; while the intermediate area of vast plains with their woodland borders constitutes the prairie region of Manitoba and the North-West Territories.

“To characterise in a few lines a country covering more than half the continent of North America, and reaching from the latitude of Constantinople to the North Pole—a country whose circuitous coast-line on the Atlantic measures 10,000 miles, and whose western shore upon the Pacific, studded with islands and indented by secure harbours and deep inlets, attains almost an equal length—a country where maize and peaches are staple crops, and where vegetation fades out upon the desolate and melancholy shores of the Arctic Ocean,—to characterise such a country by a few general phrases is evidently impossible. If we look at the eastern portion alone, we see the greatest forest region in the world. If we consider the central portion, we are regarding the great prairie country; but if we cross the passes into the Pacific Province, we enter upon that ‘Sea of Mountains,’ compared with which the most mountainous country in Europe is of limited extent.

“And yet, there are aspects in which, when British Columbia is excepted, this great country may be apprehended by a wide generalisation. It is a country of broad lakes and flowing waters. A country where the abundance of streams and the regularity of summer rains preclude the possibility of drought. It is a land of grass and forest. A country containing by far the largest portion of fresh water upon the globe; where, 2000 miles from the ocean, the traveller may lose sight of land and be prostrated by sea-sickness. A land containing the most extensive water-ways in the world; where thousands of miles of navigable rivers may conduct commerce into the remotest corner of the continent at its widest part. The slope of the land from the Rocky Mountains is so gradual that the rivers flow with an even stream, and their sources are so certain that they flow with an equable volume. The only abrupt fall of land from Edmonton to the sea is the terrace at Niagara. That fall, and the minor rapids of the St. Lawrence, are overcome by the most complete system of canals in the world, and, with one transshipment at Montreal, goods can be landed at the head of Lake Superior in the centre of the continent, 2384 miles from the Straits of Belleisle. Of this distance, 1500 miles are in fresh water; but if we turn farther north, and enter Canada by Hudson’s Bay, the ocean ship will reach, at Port Nelson, the outlet of a river system stretching out with few interruptions to the very backbone of the continent; and draining an interior basin, remoter than the St. Lawrence basin, of over 2,000,000 square miles in extent. This profound penetration and permeation of the country by water-ways is the great characteristic of Canada. From Port Nelson to Liverpool is 2941 miles—from New York to Liverpool is 3040 miles. It is difficult to realise the fact that there, in the very centre of America, an Englishman is 99 miles nearer home than at New York.”*

* ‘Handbook for the Dominion of Canada.’ Dawson Bros., Montreal, 1884, p. 4.

In writing on such a subject as the agriculture of Canada, it is hardly possible to at once plunge into technical details, without entering at some little length into the natural features of the different sections of the Dominion. In discussing the farming of, for example, an English county, it would be safe to assume on the part of the reader a general knowledge of facts which, in the case of the vast area of Greater Britain now under consideration, it would perhaps be hardly fair to take for granted. The Marquis of Lorne, in a beautifully illustrated work recently published, which should be read by every one who is interested in the Dominion, speaks of "the general ignorance of Canada in England," and remarks aptly enough * :—

"Although Canada is now only eight days from our shores, and Australia can be reached in the time which a sailing vessel formerly took to reach America, yet there is still a vast amount of misconception of the position and prospects of our dependencies. It is, perhaps, a misfortune that men often begin to acquire a useful knowledge about the colonies when it is too late for them to make use of it for their own good. The information as regards the prospects of life in these great territories should be given in the schools and universities. To many a boy an accurate knowledge of how money can best be made, and the early years of manhood most profitably spent in Australia, New Zealand, and the Dominion of Canada, would be of far more use than much of the obsolete erudition still retailed to him in our English public schools. The voyages of Cook, of Champlain, and Vancouver are as interesting as are those of Ulysses, and the subsequent history of the lands they discovered the most edifying for an English boy. If true information were readily obtained, and colonial life were brought as familiarly to the minds of Englishmen as their own home life, it is difficult to believe that there would remain so many here who have no occupation but the proverbial privilege of grumbling at their own fate, and at all around them. In Canada, if it were not for the constant bright sunshine, and for certain improvements in the art of Government, both central and local, the Scotch and English emigrants might imagine that they had never left the Old World, so good are the schools, so orderly are the people, so easy the communication from one district to another."

During the last two or three years, that portion of Canada known as the Prairie has attracted far more attention in England than has lately been bestowed upon the older and better-known provinces of the Dominion. It has been deemed advisable, therefore, to devote the first part of this paper to a discussion of the natural and agricultural features of Manitoba and the North-West. As the agricultural development of a country must be largely influenced by the character of its surface, the constitution and capabilities of its soils, the composition and value of its native herbage, and, above all, by its climate, a notice of these and allied subjects will naturally prepare the way for the

* 'Canadian Pictures drawn with Pen and Pencil.' By the Marquis of Lorne, K.T. London, the Religious Tract Society, 1884, p. 21.

subsequent description of prairie farming. The latter part of the paper deals with the agriculture of the longer settled and better known provinces of Eastern Canada.

THE PRAIRIE.

Physical Features.—The surface of the prairie region of British North America occupies three extensive steppes, or table-lands, the lowest of which is on the east, and the most elevated on the west. The political boundary between Canada and the Western United States is here identical with the 49th parallel of north latitude, and along this line the prairie extends from the 96th to the 112th meridian, a distance of about 900 miles from east to west. Northwards the prairie becomes narrower, and where it disappears on the bleak coasts of the Arctic Ocean its width does not exceed 400 miles. The Canadian prairie is bounded on the east by the rocky plateau which fringes the western shores of Lake Winnipeg, and then strikes west and north-west to Lake Athabasca. This plateau consists of very ancient crystalline rocks, of Laurentian and perhaps Huronian age, and does not present an unbroken front to the prairie, for it is penetrated by the Nelson and Churchill rivers on their way to Hudson's Bay. The character of this plateau may be well observed in travelling along the Canadian Pacific Railway from Port Arthur, Lake Superior, to the city of Winnipeg, a distance of 429 miles, nearly 340 of which are across this boundary; much of the scenery is wild and rocky, and suggestive of mineral wealth, while in some parts dense woods and undergrowth, and in others extensive swamps, meet the eye. This wide belt of country presents few or no features of agricultural interest, and, indeed, whatever agricultural development it is capable of is likely to be long deferred, while such vast areas of fertile treeless prairie remain to the west. In the neighbourhood of Telford, 338 miles west of Port Arthur, and 91 miles east of Winnipeg, the rocky plateau, with its poplars, tamaracs, and other trees, gives place to a level sweeping country with stunted shrubs, and the clear rapid streams of the rocks are replaced by sluggish, muddy rivulets. The land of rock and swamp and timber is left behind, and the rich alluvial soil of the eastern fringe of the prairies is entered upon, for this is the Red River valley, with its eastern belt of muskeg, or floating swamp, 20 miles wide.

The western boundary of the prairie region is constituted by the magnificent natural rampart of the Rocky Mountains, the junction of plateau and mountain being usually flanked by foothills, such as those to the south and west of Calgary, among which

the Canadian cattle ranches have been established. This superb mountain axis consists really of a series of parallel ranges, their total breadth from east to west extending some hundreds of miles, and the loftier peaks being clad with perpetual snow thrown into bold relief when contrasted with the dark green hues of the pine trees which clothe the lower slopes. Professor Ramsay, of Glasgow University, writes :—

“There are few grander sights than the circle of the Alps as seen from the Milan Cathedral, scarcely less fine is the vast wall of the Pyrenees as sighted from Toulouse, but neither the one nor the other presents so magnificent a spectacle as that steep, straight line of anowy peaks, rising in one endless chain out of the flat to put bounds at length to the seemingly boundless prairie.”

The Rockies constitute the water-parting* which separates the rivers that take their origin on the eastern water-shed from those which are fed by the drainage of the Pacific slopes.

Almost coincident with the political boundary on the south of the Canadian prairie there stretches in a sinuous course from east to west a line of water-parting which separates the river basins of the Mississippi-Missouri system on the south, from those of the Saskatchewan, the Assiniboine, and the Red Rivers on the north, whose waters, passing through Lake Winnipeg, are ultimately discharged into Hudson's Bay. East of the Red River this water-parting attains an elevation of some 1400 feet; farther west, in the State of Dakota, it rises to 2000 feet; and as the mountains are approached it reaches a height of about 4000 feet above the sea-level.

Considerably to the north, in the region of the 54th parallel, another water-parting, trending generally east and west, separates the drainage areas of those rivers, such as the Athabasca and Peace Rivers, which flow directly into the Arctic Ocean, from those of the great Saskatchewan system; but this line of water-parting attains a less lofty elevation than the more southern one.

Roughly speaking, the Canadian portion of the three steppes or plateaux forming the prairie region, may be regarded as enclosed or embraced by the four natural boundaries whose position I have endeavoured to indicate,—the old Laurentian plateau on the east and north-east, the Rocky Mountains on the west, and the two lines of water-parting lying respectively north and south. Although, as has been stated, the vast plains extend to the shores of the Arctic Ocean, yet north of the North Saskatchewan River the essential prairie features are not

* “To avoid all ambiguity it is perhaps best to set aside the original meaning of ‘watershed,’ and employ the term to denote the slope along which the water flows, while the expression ‘water-parting’ is employed for the summit of this slope.”—Huxley, *‘Physiography,’* p. 18.

retained, most of this northern area being covered with dense forests of evergreen trees.

The whole of the prairie region has a gradual but gentle slope from west to east, amounting for the entire area to about 5 feet per mile. Along two lines, however, which are more or less parallel, and which trend in a north-west and south-east direction, a rise decidedly marked, but not abrupt, is encountered in proceeding from east to west; these are the escarpments which form the boundaries of the second and third prairie steppes. The lowest and most eastern prairie-level is that which comprises the Red River valley, and Lake Winnipeg with its adjacent lands on the west. The average altitude of this plain is about 800 feet, the surface of Lake Superior being 627 feet above the sea; its average breadth exceeds 100 miles, and its area is about 56,000 square miles, of which one-fourth is water. This level is bounded on the east by the Laurentian plateau, and on the west by the first escarpment, which is ascended in the neighbourhood of Macgregor, 80 miles west of Winnipeg. This escarpment trends north-west, through the "mountains" lying to the west of Lake Winnipegosis.

When the summit of the first escarpment is reached, in the neighbourhood of Macgregor, a vast open country, called the Great Plains, and forming the second prairie steppe, is entered upon. On the 49th parallel of latitude this second steppe is 230 miles wide, while farther north, on the 54th parallel, its width is not more than 200 miles. Its average elevation is about 1600 feet, and it is bounded westward by the remarkable physical feature known as the Grand Coteau of the Missouri (Fr. *côteau*, a hill-slope), which is chiefly a great mass of glacial detritus and ice-travelled blocks, resting upon a sloping surface of rocks of Cretaceous age, and extending diagonally across the central region of North America, from south-east to north-west for a distance of about 800 miles. On the 49th parallel the Coteau is 30 miles wide, and it broadens out somewhat as it is traced northward. As the Coteau is ascended from its eastern base, the surface is seen to become gradually more undulating, and in its upper parts the drift materials are confusedly accumulated into low hills, which, however, seldom attain a greater height than 100 feet above the level of the Coteau, the average elevation of which, at the 49th parallel, is 2000 feet. The Coteau belt is practically destitute of drainage valleys, hence the waters of its pools and lakes are charged with salts, particularly magnesium and sodium sulphates. The western part of the Coteau contains wide deep valleys, with tributary *coulées*, which are mostly dry, or else occupied by chains of small lakes, which dry up in summer, and thus leave large white

patches of efflorescent salts, which present a marked contrast with the crimson tufts of the marsh samphire, *Salicornia*, fringing the border. Besides the smaller sheets of water, there are much larger saline lakes, such as the Old Wives' Lakes, which are persistent. The Missouri Coteau is about 400 miles west of Winnipeg, and fringes the eastern margin of the third and highest prairie steppe, which extends, with a gentle ascent westward, to the base of the Rocky Mountains.

The lowest and most eastern prairie steppe is largely identical with, though broader than, the Red River valley. The floor of this valley is entirely of alluvial origin, and consists chiefly of the sediments of a great lake of post-glacial age, comprising exceedingly fine silt, covered by black vegetable mould. The valley is about 40 miles wide, and extends along either side of the river from north to south of the province of Manitoba. Its surface is perfectly flat and undiversified, "the most absolutely level prairie region of America."

From the western boundary of the Red River valley to the foot of the Rocky Mountains, the distance across the second and third prairie steppes is about 700 miles. The surface of the second prairie steppe is less even than that of the Red River valley, and is covered with thick deposits of drift, consisting chiefly of detritus worn from the soft underlying rocks, but mingled with other mineral rubbish transported from a distance. From the prairie level there arise in certain localities low hills, such as Turtle Mountain and the Touchwood Hills, composed of accumulations of drift materials similar to those of the Missouri Coteau. Turtle Mountain nowhere attains a height of more than 500 feet above the prairie. It is a region of broken hilly ground about 20 miles square, is thickly wooded, and hence presents a marked contrast to the general features of the prairie. As a rule, the hilly regions composed of gravel are wooded; whereas the finer material of the plains has a grass-covered surface, except in some places along the sides of streams where timber also grows.

The third steppe, lying west of the Coteau, has a much thinner covering of drift deposits, a good deal of which consists of fragments of quartzite from the Rocky Mountains. Its eastern part presents in places thick deposits of true till or boulder clay. Its surface is more worn and diversified than is the case with the first and second steppes, and, as the Rockies are approached, it is found to consist of fragments of quartzite with softer shaly and slaty rocks and limestone. In various localities boulders are numerous, and some of these have been used in modern times by the buffalo as rubbing-stones, and are surrounded by basin-shaped depressions formed by the feet of these animals:—

"The buffalo is now extinct on these plains; but abundant traces of its former presence exist in the rubbing-stones, wallows, deeply-worn paths, and bleached skeletons, and at one place on the Bow River we saw a large deposit of bones covered with earth washed down from above, and apparently indicative of the destruction of a herd from some natural cause, perhaps unusual cold and heavy snow. The latter, when followed by thaw and frost, producing a hard icy crust, has sometimes proved destructive to cattle on the higher plains."*

The third steppe, which has a width of 450 miles on the 49th parallel, narrows rapidly as it is traced northwards.

"The geology of our great North-West, like our vast plains and immense rivers, is on a magnificent scale. To the eye of the geologist a grand vision appears as he contemplates the marvellous panorama that rolls before him, portraying the geological features of the country lying between the Laurentian rocks to our east, and the lofty mountains of the west. The former, representatives of the first rocks to triumph over the universal waters of primeval days, and the latter belonging to a period near the summit of the geological series. Between these great natural boundaries we see stretching before us the three vast prairie-steppes of the North-West, rising in succession above each other and distinguished by characteristic physical features."†

Underlying nearly the whole of the prairie region are clays, sandstones, and limestones of Cretaceous age, or (in the more western parts) shales and sandstones of the Laramie‡ or Lignitic Tertiary group, the age of the latter being probably intermediate between that of the Cretaceous and of the Eocene of England. The nearest parallel to be found at home is afforded by the greater part of the counties of Norfolk and Suffolk, where Cretaceous rocks (chalk in this case) are overlaid by glacial detritus or drift. The alluvium of the Red River valley rests upon strata of Silurian age.

Though the prairie soils are largely either of glacial or of alluvial origin, they are not the product exclusively of such agencies:—

"Long continued growth and decay of vegetation upon a land surface not only promotes disintegration of the superficial rock, but produces an organic residue, the intermingling of which with mineral debris constitutes vegetable soil. Undisturbed through long ages, this process has, under favourable conditions, given rise to accumulations of a rich dark loam. Such are the 'regur,' or rich black cotton soil of India, the 'tchernayzem,' or black earth, of Russia, containing from 6 to 10 per cent. of organic matter, and the deep fertile soil of the American prairies and savannahs. These formations cover plains many thousands of square miles in extent."§

Nor must the effects of animal life be overlooked:—

"Burrowing animals, by throwing up the soil and subsoil, expose these to

* 'Observations on the Geology of the Line of the Canadian Pacific Railway.' By Sir J. W. Dawson, F.R.S. 'Quart. Jour. Geol. Soc.' 1884, p. 387.

† 'Geology of the Red River Valley.' By J. Hoyes Panton, M.A.

‡ A term derived from Laramie City, in the State of Wyoming, lat. 42°.

§ 'Text-book of Geology.' By Archibald Geikie, F.R.S., p. 458.

be dried and blown away by the wind. At the same time their subterranean passages serve to drain off the superficial water and to injure the stability of the surface of the ground above them. In Britain the mole and rabbit are familiar examples. In North America the prairie dog and gopher have undermined extensive tracts of pasture land in the west.*

These last are little animals allied to the squirrel, the so-called prairie dog being a rodent, and not a carnivore. I saw numbers of them scampering along the ground beside the track of the Canadian Pacific Railway. Their open burrows are inconvenient to horses travelling across the prairie, and sometimes the animals become a nuisance by devouring newly sown seed; on the Bell Farm a halfpenny each is given for their tails.

The beaver, again, though receding at the approach of man, has left unmistakable signs of his former presence:—†

"The flow of streams is sometimes interfered with, or even diverted, by the operations of animals. Thus the beaver, by cutting down trees (sometimes one foot or more in diameter) and constructing dams with the stems and branches, checks the flow of water-courses, intercepts floating materials, and sometimes even diverts the water into new channels. This action is typically displayed in Canada and in the Rocky Mountain regions of the United States. Thousands of acres in many valleys have been converted into lakes, which, intercepting the sediment carried down by the streams, and being likewise invaded by marshy vegetation, have subsequently become morass and finally meadow-land. The extent to which, in these regions, the alluvial formations of valleys have been modified and extended by the operations of the beaver is almost incredible." ‡

The conservative action of animals upon the earth's surface is less marked, but the following case deserves mention:—

"In the prairie regions of Wyoming and other tracts of North America, some interesting minor effects are referable to the herds of roving animals which migrate over these territories. The trails made by the bison, the elk, and the big-horn or mountain sheep, are firmly trodden tracks on which vegetation will not grow for many years. All over the region traversed by the bison, numerous circular patches of grass are to be seen which have been formed on the hollows where this animal has wallowed. Originally they are shallow depressions formed in great numbers where a herd of bisons has rested for a time. On the advent of the rains they become pools of water; thereafter grasses spring up luxuriantly, and so bind the soil together that these grassy patches, or 'bison-wallows,' may actually become slightly raised above the general level if the surrounding country becomes parched and degraded by winds." ‡

On the level prairies the buffalo trails may be seen, stretching away in dark and well-defined straight lines, till the eye fails to distinguish them in the distance.

* 'Text-book of Geology,' p. 455.

† *Ibid.*

‡ *Ibid.*; and Comstock in Captain Jones's 'Reconnaissance of N.W. Wyoming,' 1875, p. 175.

It is worthy of note that the earthworm, the most useful of all animals in the soil, appears to be absent from the prairie, or is at least very uncommon. Professor Macoun informs me that he has never seen one on the prairie, nor has he ever heard of one being seen by the Dominion land surveyors. Of course, this is only negative evidence, but if the lowly annelid be not already a dweller in the prairie soil, it is difficult to imagine why it should not become so, save perhaps in the alkali lands and "bad lands." This absence is, however, probably apparent rather than real, for Darwin states* that "earthworms are found in all parts of the world," although he does not refer specifically to the American prairies.

Soils.—The remarkable richness of much of the prairie soil of Manitoba arises from the accumulation for ages past of the excreta of animals, the ashes of prairie fires, and the decaying remains of plants and animals, in a loamy matrix resting upon a retentive clay subsoil. In 1882, between forty and fifty samples of soil, taken at intervals between Winnipeg and the Rocky Mountains, were exhibited at the Royal Agricultural Society's Show at Reading; they were shown in glass tubes, four feet in length, each tube containing a core of the soil and subsoil from the surface downward. Three samples of the surface soils were submitted to Sir J. B. Lawes, F.R.S., and Dr. J. H. Gilbert, F.R.S., for the determination of the nitrogen. No. 1 was from Portage la Prairie, 56 miles west of Winnipeg, and had probably been under cultivation for several years; the dry mould contained 0.2471 per cent. of nitrogen. No. 2, from the Saskatchewan District, about 140 miles from Winnipeg, had probably been under cultivation a shorter time than No. 1; its dry mould contained 0.3027 per cent. of nitrogen. No. 3, from a spot about 40 miles from Fort Ellice, might be considered a virgin soil; the dry mould contained 0.2500 per cent. of nitrogen. In general terms, these soils are about twice as rich in nitrogen as the average of the Rothamsted arable surface soils; and, so far as can be judged, are probably about twice as rich as the average of arable soils in Great Britain. They correspond in their amount of nitrogen very closely with the surface soils of our permanent pasture land. At the recent meeting of the British Association at Montreal, Sir J. B. Lawes and Dr. Gilbert presented to the Chemical Section a paper "On some points in the composition of soils, with results illustrating the sources of the fertility of Manitoba prairie soils," and I am indebted to Dr. Gilbert for his kindness in revising a Canadian newspaper report, from which I proceed

* 'The Formation of Vegetable Mould through the Action of Worms,' p. 120.

to make a few extracts. Besides the three soils already referred to, four other Manitoba soils were examined in greater detail. They came respectively from Niverville, 44 miles west of Winnipeg; from Brandon, 133 miles west of Winnipeg; from Selkirk, 22 miles north-east of Winnipeg; and from Winnipeg itself. These soils showed a very high percentage of nitrogen; that from Niverville nearly twice as high a percentage as in the first 6 or 9 inches of ordinary arable land, and about as high as the surface soil of pasture land in Great Britain. That from Brandon was less rich, still the first 12 inches of depth is as rich as the first 6 or 9 inches of good old arable lands. The soil from Selkirk showed an extremely high percentage of nitrogen in the first 12 inches, and in the second 12 inches as high a percentage as in ordinary pasture surface soil. Lastly, both the first and second 12 inches of the Winnipeg soil were shown to be very rich in nitrogen, richer than the average of old pasture surface soil. To determine to what extent the nitrogen in these soils is susceptible of nitrification, and so of becoming available for plant-growth, the soils and subsoils were placed in shallow dishes, covered with plates of glass, kept under proper conditions of temperature and moisture for specified periods, extracted from time to time, and the nitric acid determined in the extracts. The periods were never less than twenty-eight days, and the rate of nitrification declined after the third and fourth periods. In the case of the subsoils, there was a very marked increase in the rate of nitrification during the eighth period as compared with the seventh, there having been only a tenth of a gram of garden soil containing nitrifying organisms added. This result is very striking, and of much interest, affording evidence that the nitrogen of subsoils is subject to nitrification if only in suitable conditions, and the result lends confirmation to the view that deep-rooted plants may favour nitrification in the lower layers of the soil.

The authors further state that official records show that the rich prairie soils of the North-West are competent to yield large crops, but under present conditions they do not give yields commensurate with their richness, compared with the soils of Great Britain, which have been under arable cultivation for centuries. That the rich prairie soils do not yield more produce is due partly to climate, but largely to scarcity of labour, and consequent imperfect cultivation, thus leading to too luxuriant a growth of weeds; and until mixed agriculture and stock-feeding can be had recourse to, and local demand arises, the burning of the straw, and deficiency and waste of manure, are more or less inevitable, but still exhausting practices. So long as land is cheap and labour dear, some sacrifice of

fertility is unavoidable in the process of bringing these virgin soils under profitable cultivation, and the only remedy is to be found in increase of population. Still the fact should not be lost sight of, that such practices of pioneer settlement do involve serious waste of fertility. It may not be out of place to append the opinion of the Rothamsted investigators, that a fertile soil is one which has accumulated within it the residue of ages of previous vegetation, and that it becomes infertile as this residue is exhausted.

Through the kindness of my colleague, Dr. J. M. H. Munro, F.C.S., I am able to give the following complete analysis of, and report upon, a sample of prairie soil taken from the first 12 inches :—

Analysis of Prairie Soil from Birtle, Manitoba.

The soil dried at 212° F. contains—

Organic matter and combined water	..	..	9.70
Small stones and gravel	..	..	1.41
Gravelly sand	..	..	2.45
Coarse sand	..	..	64.20
Fine sand	..	..	11.70
Clay and clayey sand (ignited)	..	..	10.54
			100.00

Associated in the air-dried soil with—

Moisture	..	..	..	..	..	..	6.70
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The fine earth (passing through a sieve 30 meshes to the inch) dried at 212° F. contains—

Organic matter and combined water	..	..	10.07
Sand and silicates	..	..	83.41
Peroxide of iron and alumina	..	..	4.195
Carbonate of lime	..	..	0.96
Potash (K_2O)	..	..	0.271
Phosphoric acid (P_2O_5)	..	..	0.195
Magnesia (MgO)	..	..	0.487
Chlorine	..	..	0.010
Sulphuric acid (SO_3)	..	..	trace
Not determined, and loss	..	..	0.402
			100.000

			Per cent.
Total nitrogen	..	..	0.412
Total minerals dissolved by cold water	..	..	0.048
Potash soluble in water	..	..	0.0081

The sand and gravel of the soil consist chiefly of fragments and pebbles of quartz, with an admixture of other minerals derived from igneous rocks, and here and there a spangle of mica. The black colour is due to vegetable matter, which is present in very large proportion, and is the chief source of the great fertility of the soil. A rough measure of this fertility is the percentage

of nitrogen in the fine earth, which is at least double that found in the surface soil of good English pasture. There is an ample proportion of phosphoric acid, and the supply of potash is very large, as is usually the case with soils formed of the debris of volcanic rocks. Lime alone, of all the elements of fertility, is present in feeble proportion, and its application to this and similar soils will probably be of great benefit in the near future, before the need arises for the use of the ordinary artificial manures. The high relative proportion of magnesia is noteworthy in connection with the wheat-growing properties of the soil.

Native Herbage.—The most essential feature of the prairie is, perhaps, its treeless character, this characteristic being, in fact, indicated in the name (Fr. *prairie*, a meadow). Thus the great mass of the vegetation of the prairie is composed of herbage, though shrubs may sometimes be seen in swampy localities, and the course of a river or stream is often indicated by a line of low trees. The character and feeding quality of the prairie herbage are matters of prime importance from an agricultural point of view, and it is well to recall the fact that for ages the prairie has been the grazing ground of vast herds of buffalo, whose descendants are now fast disappearing. This fact alone is highly suggestive of the nutrient character of the plants which clothe the prairie; much more so, indeed, than might at first be inferred from a cursory examination of the prairie flora. On my journey to the Rocky Mountains I was fortunate in making the acquaintance of Professor John Macoun, M.A., F.L.S., the botanist to the Geological and Natural History Survey of Canada, and still more fortunate in being allowed, through this gentleman's kindness and courtesy, to avail myself of his advice and experience, founded on years of arduous labour and exploration in the North West. On my mentioning to Professor Macoun my desire to familiarise myself with the native forage plants of the prairie, and particularly with the grasses and clovers, I was much surprised by his informing me that there is not a single true clover, not one species of the genus *Trifolium*, indigenous to the prairie soil. Nevertheless, the leguminous family, as a whole, is by no means unrepresented on the prairie; and, as a matter of fact, while in Ontario only twenty-six species of *Leguminosæ* have been recorded, no less than forty-two species have been found in the North-West, the most noteworthy of these being, perhaps, the so-called purple prairie clover, *Petalostemon violaceum*; the white prairie clover, *P. candidus*; the purple prairie vetch, *Vicia Americana*; the prairie pea or purple pea-vine, *Lathyrus venosus*; and various milk vetches belonging to the genera *Astragalus* and *Oxytropis*. Though the leguminous herbage of the prairie presents no species identical with those of Britain, the species of *Graminææ*, on the other hand, coincide

in a few cases with native British grasses; but this is the exception rather than the rule. Species of grasses common to both the prairie herbage and the British flora are *Agrostis vulgaris*, *Kæleria cristata*, *Poa pratensis*, *P. annua*, *Triticum repens*, *T. caninum*, and *Hierochloe borealis*. I was surprised at the quantity of couch grass, *Triticum repens*, known in Canada as quick or quack grass, which came under my notice; but Professor Macoun told me that the variety which grows on the prairie is non-stoloniferous, and therefore does not form the bed or couch of interlacing underground stems, which are found so objectionable by the English farmer; it is readily eaten by stock, and constitutes a most valuable grass on all clay and alkaline soils of the prairie.

The following is a list of the chief prairie grasses, arranged alphabetically instead of in botanical sequence:—

Systematic Name.	Common Name.	Usual Habitat.
<i>Agrostis scabra</i> .	Tickle grass.	River banks.
<i>A. vulgaris</i> .	Red top or lowland pasture grass.	Common.
<i>Andropogon scoparius</i> .	Purple wood grass.	Sandy slopes.
<i>Brizopyrum spicatum</i> .	Spike grass.	Salt marshes.
* <i>Bouteloua oblongistachya</i> .	Buffalo grass.	Dry or sandy plains.
* <i>Calamagrostis Canadensis</i> .	Blue joint grass.	Swamps and woods.
<i>Danthonia Californica</i> .	Californian oat grass.	Cypress hills.
<i>D. intermedia</i> .	Prairie oat grass.	Rich prairies.
<i>D. sericea</i> .	Silky oat grass.	Bow River.
<i>D. spicata</i> .	Wild oat grass.	Forest openings.
<i>Elymus condensatus</i> .	"Bunch" grass.	Southern plains.
* <i>Glyceria airoides</i> .	Narrow-leaved spear grass.	Salt marshes.
<i>G. distans</i> .	" "	Ditto.
* <i>G. tenuiflora</i> .	Meadow spear grass.	Ditto.
<i>Hierochloe borealis</i> .	Seneca grass. Holy grass.	Prairies, very common.
<i>Hordeum jubatum</i> .	Squirrel-tail grass.	Salt marshes.
<i>Kæleria cristata</i> .	"Bunch" grass.	Dry hills and river banks.
<i>Poa annua</i> .	Annual spear grass.	Around Winnipeg.
<i>P. cæsia</i> .	" "	Prairies.
<i>P. pratensis</i> .	Red top or June grass.	Everywhere.
<i>P. serotina</i> .	Fowl meadow grass.	Wet places.
* <i>P. tenuifolia</i> .	Slender-leaved Poa.	Prairies.
<i>Setaria setosa</i> .	"Foxtail."	Prairies.
* <i>Spartina cynosuroides</i> .	Freshwater cord grass.	Prairie marshes.
* <i>S. gracilis</i> .	Graceful salt-marsh grass.	Salt marshes.
<i>Sporobolus heterolepis</i> .	Dropsseed grass.	Dry soils.
<i>Stipa comata</i> .	"Bunch" grass.	Rather scarce.
* <i>S. sparteo</i> .	"Wild oat" buffalo grass.	Everywhere.
<i>S. viridula</i> .	Feather grass.	Ditto.
<i>Triticum caninum</i> .	Dog's-tooth grass.	Thickets and river banks.
* <i>T. repens</i> .	Couch grass.	Salt marshes.
* <i>Vilfa cuspidata</i> .	Rush grass.	Damp prairies.
<i>Zizania aquatica</i> .	Wild rice.	Swamps.

As the reader will probably be acquainted with some of these, at least by their common names, it may be well to add a few descriptive details. The true American buffalo grass, unknown in Canada, but common in the states of Kansas and Colorado, is *Buchloe dactyloides*; it throws out numerous runners, like a strawberry, and these, taking root, form new plants. The Canadian buffalo grasses are, *Bouteloua oligostachya*, growing most abundantly in the southern districts, and *Stipa spartea*, which, though found on all the prairies of the North West, is commonest in the northern regions, and particularly on the Buffalo Plains. *Stipa spartea* is the famous grass of the hills in the Bow River country, and forms the bulk of the winter pasture of the great plains. It is allied to the ornamental feather grass, *Stipa pinnata*, of English flower-gardens, and has an awn some seven inches long. The "bunch" grasses are so called from their habit of growing in bunches or tussocks. Our English meadow foxtail, *Alopecurus pratensis*, is neither native nor cultivated in Canada, and the term foxtail is there applied both to the barley grass, *Hordeum jubatum*, and to the millet grass, *Setaria setosa*. The two grasses called red top, *Agrostis vulgaris* and *Poa pratensis*, are found chiefly on the eastern prairies; the latter is also known as the blue grass of Kentucky. The wild rice, *Zizania aquatica*, grows luxuriantly in damp and marshy situations in Northern Manitoba, and it constitutes a delicious article of food. It is quite distinct from, though related to, the common commercial rice, *Oryza sativa*, and its grains are dark coloured.

In some regions of the prairie, and particularly in the more swampy districts, certain sedges enter largely into the composition of the herbage, the following being the commoner ones:—

Systematic Name.	Common Name.	Usual Habitat.
* <i>Carex aristata</i> .	Awned sedge.	Marshes.
<i>C. disticha</i>.	.. ..	Ditto.
* <i>C. lanuginosa</i> .	Woolly fruited sedge.	Ditto.
<i>C. prairea</i> .	Prairie sedge.	Ditto.
* <i>C. maritima</i>.	.. ..	Open prairies.

One only of these, *C. disticha*, is also British, and a British species of rush, *Juncus Balticus*, the Baltic rush,* is likewise common on the prairie. The sedges constitute much of the prairie hay, and make up the greater part of the vegetation of the ponds and marshes. On the other hand, in the vicinity of woods, wild vetches and peas, and various rosaceous and composite plants, mingle with the grasses and yield excellent prairie hay. The elegant little prairie rose, *Rosa blanda*, which only attains

* This is the wire-grass of Utah.

a height of about six inches, supplies in its hips a much-relished food in the fall of the year to horses and to the prairie chicken; and the composite plant, *Artemisia frigida*, known as "pasture sage," and the general appearance of which resembles that of wormwood, constitutes almost the sole winter food in some localities. *Eurota lanata*, the "white sage," a plant allied to our spinach and goosefoot, is abundant on the tops of dry hills in the southern plains.

The grasses and sedges marked with an asterisk in the foregoing lists, are held to possess special value as forage plants. *Hierochloe borealis*, which is the holy grass of Scotland and Northern Europe, having been formerly used for strewing on the floors of churches at certain seasons, is very general on the prairie, and possesses a pleasant, lavender-like fragrance which it imparts to the prairie hay; the Red Indians plait it into the form of a border to surround the birch-bark mats they are so expert in making. Professor Macoun told me that, on high dry grounds, the best pasture grasses met with are: *Andropogon scoparius*, *Bouteloua oligostachya*, *Hierochloe borealis*, *Poa cæsia*, *P. tenuifolia*, *Sporobolus heterolepis*, *Stipa comata*, *S. spartea* (the best of all), *S. viridula*, *Triticum caninum*, and *Vilfa cuspidata*. The good forage grasses of the salt marshes are: *Glyceria airoides*, *Spartina cynosuroides*, *S. gracilis*, and *Triticum repens*. Horses left to themselves find their chief summer food in *Carex aristata* of the salt marshes; but as this dies with the appearance of frost, the horses then betake themselves to the higher lands, and graze on *Stipa spartea* in the winter. No pastures are more valuable in summer than those of the salt marshes, and working horses when set at liberty make straight for them.

The prairie herbage varies greatly with the locality; in that part of Manitoba north-west of Portage-la-Prairie the hay is very coarse, containing large quantities of *Spartina cynosuroides*, mixed with *Calamagrostis Canadensis* and *Poa serotina*. A western horse accustomed to finer hay will scarcely touch this, while the ponies of the neighbourhood eat it with avidity. On the drier prairie this kind of hay is not seen, while other varieties are abundant. Where ponds abound, much of the hay consists of certain species of *Carex*, *Poa*, and *Calamagrostis*. If the soil is rich and not too moist, the *Carices* disappear, and grasses of the genera *Danthonia*, *Elymus*, *Hierochloe*, *Triticum*, and *Vilfa*, with numerous *Rosacæ* and *Leguminosæ*, appear in great profusion. The hay in river valleys is almost wholly *Carex aristata*, *Calamagrostis Canadensis*, and *Poa serotina*; this is also the hay of the mixed forest and prairie country.*

* 'Manitoba and the Great North-West.' By John Macoun, M.A., F.L.S.

The nutritive value of the prairie grasses is not only due to their abundant foliage, but in some cases to the production of grain also; and Professor Macoun attributes their eminent feeding properties, not so much to the inherent value of the species themselves, as to the soil and climate in which they are grown. It must not be forgotten that for many centuries the prairie, in the production of buffalo beef, has been simply grazed; how its herbage will submit to the new order of things, in which large tracts are to be mown year after year, remains to be seen. Numerous species of grass, which on the Canadian prairies grow tall enough to be cut for hay, in the drier country south of the political boundary seldom attain a greater height than a few inches. I was told everywhere that during the months of May and June, when most of the plants are in flower, the prairie presents a most lovely sight; nor was it difficult to imagine this after seeing the floral stragglers which still decked the plain in September. As to the life-sustaining capability of the prairie in the winter, I cannot do better than quote the following words,* merely remarking that La Belle Prairie, where Viscount Milton and Dr. Cheadle wintered in 1862-3, is west of Carlton and somewhat north of Battleford, on the North Saskatchewan River, and adding that Dr. Cheadle, in whose company I had the pleasure of travelling across the prairie, has lost none of his enthusiasm with regard to the future of the vast territory which he did so much to make known to his countrymen twenty years ago:—

"We now prepared to leave our winter quarters, as soon as the snow had disappeared sufficiently to admit of travelling with carts. The first thing to do was to find the horses, which had been turned loose at the commencement of the winter. We had seen them or their tracks from time to time, and knew in what direction they had wandered. La Ronde followed their trail without difficulty, and discovered them about eight or ten miles away. We were very much astonished at their fine condition when he drove them back to La Belle Prairie. Although very thin when the snow began to fall, and two of them had been used for sleigh work in the early part of the winter, they were now perfect balls of fat, and as wild and full of spirit as if fed on corn—a most unusual condition for Indian horses. The pasture is so nutritious that animals fatten rapidly even in winter—when they have to scratch away the snow to feed—if they find woods to shelter them from the piercing winds. No horses are more hardy or enduring than those of this country, yet their only food is the grass of the prairies and the vetches of the copses. The milch cows and draught oxen at Red River, and in Minnesota, feeding on grass alone, were generally in nearly as fine condition as the stall-fed cattle of the Baker Street show."

As the political boundary between the Canadian and the American prairies is of an entirely arbitrary character, being determined simply by the 49th parallel, it is evident that many

* "The North-west Passage by Land." By Viscount Milton, M.P., and W. B. Cheadle, M.D.; Cassell and Co., p. 168.

of the natural history features of the regions north and south of this line may be identical. Particularly is this so with regard to the general character of the flora, so that the following observations from an address of surpassing interest, on the "Characteristics of the North-American Flora," delivered by the veteran American botanist, Professor Asa Gray, before the Biological Section of the British Association at the Montreal meeting last year, may be appropriately quoted here:—

"Between the wooded country of the Atlantic side of the continent and that of the Pacific side, lies a vast extent of plains, which are essentially woodless, except where they are traversed by mountain-chains. The prairies of the Atlantic States bordering the Mississippi, and of the Winnipeg country, shade off into the drier and gradually more saline plains, which, with an even and gradual rise, attain an elevation of 5000 feet or more where they abut against the Rocky Mountains. Until these are reached (over a space from the Alleghanies westward of about 20 degrees of longitude) the plains are unbroken. To a moderate distance beyond the Mississippi the country must have been in the main naturally wooded. There is rainfall enough for forest on these actual prairies. Trees grow fairly well when planted; they are coming up spontaneously under present opportunities; and there is reason for thinking that all the prairies east of the Mississippi, and of the Missouri up to Minnesota, have been either greatly extended or were even made treeless under Indian occupation and annual burnings. These prairies are flowery with a good number of characteristic plants, many of them evidently derived from the plains farther west. At this season (August) the predominant vegetation is of Compositæ, especially of *Asters* and *Solidagoes*, and of *Sunflowers*, *Silphiums*, and other *Helianthoid Compositæ*.

"The drier and barer plains beyond, clothed with the short *Buffalo-Grasses*, probably never bore trees in their present state, except as now, some *Cottonwoods* (i.e., *Poplars*) on the margins of the long rivers which traverse them in their course from the Rocky Mountains to the Mississippi. Westward, the plains grow more and more saline; and *Wormwoods* and *Chenopodiaceæ* of various sorts form the dominant vegetation, some of them *sui generis*, or at least peculiar to the country, others identical or congeneric with those of the steppes of Northern Asia. Along with this common campestrine vegetation, there is a large infusion of peculiar American types, which I suppose came from the southward." *

Climate.—The essential connection between the climate of a country and its agriculture renders it indispensable to make some observations on the climate of Manitoba and the North-West Territories, and in this particular case it is all the more desirable, inasmuch as considerable misapprehension and, it may be, prejudice exist in England on the subject. The region under notice is bounded on the south by latitude 49°, on the north by latitude 60°, on the east by the meridian of 95°, and on the west by the Rocky Mountains, and it covers, in round numbers, an area of 668,000 square miles. Much information was obtained in Captain Palliser's expedition in 1857, and many important facts have been subsequently established by Professor

* 'Nature,' Jan. 15, 1885, p. 254.

Macoun. The conditions which determine the climate of the vast continental region occupied by the prairie may be most conveniently studied as the factors of a physiographical problem of national importance. The normal seasons comprise a long, severe, but dry winter, a hot summer with abundant rain, a short pleasant autumn or "fall," and a still briefer spring, which is usually dry and sunny. The opening of spring, as marked by the first appearance of spring flowers, is about the middle of April, the period being practically the same over the entire area. The diurnal temperature rapidly rises, and summer heat prevails till the middle of August, about which time a great and permanent fall in temperature takes place, and autumn sets in; the closing days of this latter season are often very beautiful, and they form the period known as the Indian summer. Winter begins within the first fortnight of November, the navigation of the Red River being closed simultaneously, though the Peace River, much farther north, usually closes later. Unfortunately, our English conceptions of the climate of the Canadian prairie are based almost exclusively on the readings of the thermometer. We hear, for example, of a temperature of 20° below zero on a winter day in Manitoba, and shudder at the bare thought of such extreme severity, as we try to imagine what suffering such a temperature would bring with it in England. But this is where the error creeps in, for the bodily sensations accompanying a temperature of, say,— 20° in England, and those associated with the same temperature on the Canadian prairie would be quite different. In fact, the thermometer alone is an insufficient guide; besides knowing the temperature of the air, it is also necessary to know the amount of moisture it contains, before arriving at a conclusion as to the agreeableness or otherwise of the atmospheric environment. Dry air is a bad conductor of heat; moist air is a better conductor, the conducting medium really being the water vapour or water dust which confers the moistness, so that, below the point of saturation, the more moisture the atmosphere contains the more freely will it conduct away heat from the surfaces of the animal body.* On the other hand, the drier the air is, the more completely does it act as an insulator, enveloping the animal body in a medium which conserves the animal warmth in so far as it offers no facility for the escape of the latter by conduction. These simple physical facts supply the reason that the winter temperatures of the

* "Varying amounts of moisture in the air materially affect the health and comfort of man. . . . Moist air is a better conductor of heat than dry air, which accounts for much of the discomfort felt in winter when a thaw takes place as compared with the feeling of elasticity when the air is dry. In cold weather, therefore, moist air cools down the skin and lungs more rapidly than dry air, and colds consequently result."—"On some relations of Meteorological Phenomena to Health." By John W. Tripe, M.D., F.R.Met. Soc.

Canadian prairie, though undoubtedly low, are yet tolerable. All over the prairies the air in winter is dry, and hence is physically different from the humid atmosphere which is associated with our insular position in this country. The dry air of the prairie performs for a man in the winter the services of a blanket; it cannot, any more than the blanket, bestow heat upon the man's body, but it can, equally with the blanket, prevent the dissipation of the warmth of the body. No doubt, if the winter temperatures of Manitoba and the North-West were associated with humidity at all approaching that of our English atmosphere, the effect would be well-nigh intolerable. Last autumn Professor Glaisher, in travelling across the prairie, made a series of observations with the dry and wet bulb thermometer. At Portage la Prairie the dry bulb registered 80° and the wet bulb 67°. The next day, at Swift current, the readings were 91° and 72° respectively. In fact, throughout the journey there was a difference between the readings ranging from 10° to 19°. To this low percentage of moisture in the air is attributed the peculiar hardness, or flintiness, of the wheat grown in Manitoba and the North-West, a property of the grain which renders it peculiarly valuable in milling operations.

The Report of the Department of Agriculture and Statistics of the Province of Manitoba for the year 1882 is specially valuable, in that it contains the results of eleven years' meteorological observations, from 1871 to 1881 inclusive. The record would extend back to earlier dates, but that the observer, Mr. James Stewart, had the misfortune to lose everything at the time of the Red River Rebellion. From the years recorded, I have selected, quite at hazard, the year 1879, and constructed the following table, an examination of which may prove of interest, it being remembered that the freezing-point is at 32° F.:—

TEMPERATURE OBSERVED at WINNIPEG, 1879.

	Mean.	Mean Maximum.	Mean Minimum.	Highest Maximum.	Lowest Minimum.	Mean Height of Barometer.
	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.	Inches.
January ..	— 2·3	7·7	— 14·3	29·5 on 26th	— 34·3 on 14th	29·1918
February ..	— 5·2	5·3	— 18·1	28·5 on 21st	— 43·6 on 26th	29·2979
March ..	14·2	27·0	— 1·6	50·0 on 30th	— 22·4 on 16th	29·1458
April ..	40·1	50·7	28·1	71·5 on 21st	— 10·3 on 3rd	29·2126
May ..	53·5	66·4	41·4	78·5 on 28th	28·3 on 6th	29·1886
June ..	64·5	75·7	51·1	88·3 on 3rd	33·0 on 1st	29·0256
July ..	67·9	80·7	56·3	93·0 on 12th	48·4 on 29th	29·0375
August ..	64·2	76·4	52·0	87·5 on 9th	40·3 on 20th	29·0784
September	51·3	65·3	38·6	77·5 on 4th	22·8 on 24th	29·1536
October ..	44·4	57·2	31·2	88·5 on 6th	5·2 on 30th	29·0663
November	20·5	29·4	10·0	48·4 on 6th	— 10·3 on 20th	29·1650
December ..	— 12·8	— 4·8	— 24·1	17·4 on 31st	— 50·5 on 24th	29·3210

The coldest day of the year appears to have been the 24th of December, when the highest reading of the thermometer was -28.4° , and the lowest -50.5° .

The following table contains further information relating to the same year:—

METEOROLOGICAL OBSERVATIONS at WINNIPEG, 1879.

	Rainfall.	Snowfall.	Total Rain and Melted Snow.	Days on which Rain fell.	Days on which Snow fell.	Number of Fogs.	Number of Thunder- storms.
	Inches.	Inches.	Inches.				
January ..	0	16.72	1.555	0	9	0	0
February ..	0	7.30	0.655	0	6	0	0
March ..	0.210	5.30	0.625	1	3	1	0
April ..	1.970	2.65	2.230	10	1	1	1
May ..	2.785	0	2.785	14	0	0	5
June ..	7.050	0	7.050	15	0	0	10
July ..	3.765	0	3.765	18	0	0	15
August ..	1.820	0	1.820	12	0	2	6
September ..	0.740	0	0.740	10	0	1	0
October ..	1.420	0	1.420	9	0	2	0
November..	0.050	3.70	0.300	2	7	1	0
December ..	0	24.23	2.290	0	13	1	0
Total ..	19.810	59.90	25.235	91	39	9	37

But perhaps the best general idea of the climate may be derived from an examination of the Table on page 240, in which are summarised the results of eleven years' observations. In that Table the total annual amount of aqueous precipitation must, of course, be looked for in the line devoted to "total rain and melted snow," as, in making up these numbers, the fall of snow is rendered into its equivalent of water.* It will be seen that, on an average, the waters of the Red River are open for navigation during seven months of the year, so that the winter season extends over five months. Mr. James Stewart, of St. Andrews, Manitoba, in presenting to the Deputy Minister of Agriculture and Statistics the figures upon which the three tables here given are based, makes use of the following remarks:—

"The climate of this country, I believe, is the finest in the world. On account of the bracing dry atmosphere the fluctuations of the temperature are not inconveniently felt, as is the case in places where the atmosphere is more humid. The warm days in summer are generally followed by cool evenings, and such a thing as very sultry and oppressive heat is scarcely known. The warm days, followed by cool nights and copious dews, facilitate the growth of cereals in a wonderful degree. The winters here are also very pleasant and bracing, proceeding from the same cause, namely, the dryness of our atmos-

* "On a very rough estimate a foot of snow yields about an inch of rain."—*Meteorology.* By R. H. Scott, F.R.S.; Kegan Paul and Co., Third Ed., p. 142.

GENERAL AVERAGE of METEOROLOGICAL OBSERVATIONS taken at WINNIPEG daily, from 1871 to 1881, inclusive.

	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	Mean for 11 Years.
Mean Height of Barometer (in Inches)	29·1369	29·1131	29·1295	29·1451	29·1474	29·3191	29·1517	29·0993	29·1520	29·1365	29·1520	29·1530
Mean Tempera- ture (in De- grees)	32·43	32·84	32·29	31·85	29·63	31·34	36·88	36·96	33·36	31·82	34·30	33·06
Maximum Tem- perature	100·3	99·5	94·3	94·5	94·3	95·0	95·0	94·5	93·0	90·3	98·0	95·34
Minimum Tem- perature	-40·3	-41·0	-36·0	-38·7	-41·6	-43·0	-44·3	-25·3	-50·5	-44·4	-40·5	-40·51
Rainfall (in Inches)	15·600	21·620	13·580	14·988	12·290	22·950	22·034	24·135	19·810	21·683	8·055	16·977
Snowfall (in Inches)	51·50	73·02	36·85	36·17	47·11	74·21	30·30	34·44	57·90	58·19	80·19	52·72
Total Rain and Melted Snow	20·175	30·170	17·040	18·314	16·847	29·184	24·608	29·516	25·235	27·166	18·094	23·304
Number of Days on which Rain fell	56	54	61	47	68	68	78	81	91	76	79	69
Number of Days on which Snow fell	48	46	55	42	57	46	29	34	39	46	49	45
Number of Fogs Number of Thun- derstorms	17 27	9 27	6 24	8 31	2 13	8 28	16 25	5 17	9 37	7 33	11 29	9 27
Navigation opened on Red River	Apr. 26	May 2	Apr. 26	Apr. 30	Apr. 29	Apr. 24	Apr. 22	Mar. 20	Apr. 12	Apr. 21	Apr. 24	Apr. 20
Navigation closed on Red River	Nov. 10	Nov. 12	Oct. 28	Nov. 11	Nov. 4	Nov. 13	Nov. 6	Nov. 27	Nov. 1	Nov. 12	Nov. 14	Nov. 13

phere As a rule the rains are chiefly in the months of May and June, the time they are most wanted for vegetation, while the fall months are generally dry, so that rarely any difficulty is experienced in harvesting the crops. The months of September, October, and November are looked upon as the finest season of the year, being remarkable for fine cool dry weather, unknown, I believe, in any other country."

A description of the climate of the Canadian North-West can hardly be deemed satisfactory unless it includes an examination of the more general physiographical phenomena which combine to render that climate what it is, and I therefore propose to make a brief reference to the phenomena in question. The general rule that the temperature increases as the equator is approached, or as the poles are receded from, is liable to many local variations, determined chiefly by the relative disposition of land and sea. If places which have the same average annual temperature are joined together on the map, the line so drawn is called an isothermal line, and sometimes the isothermals are fairly parallel with the equator. But there are many exceptions, and a notable one occurs in the case of the Canadian North-West, where, between the meridians of 100° and 120°, the isothermals rise very considerably to the north, the physical significance of which is that the North-West enjoys a much higher average temperature than many other parts of the globe in the same latitude.

"The line of equal mean temperature, especially for the season of vegetation, between March and October, instead of following lines of latitude, bends from the Mississippi valley far to the north, carrying the zone of wheat from Minnesota away to the 60th parallel in the valley of the Peace River, reproducing the summer heats of New Jersey and Southern Pennsylvania in Minnesota and Dakota, and those of Northern Pennsylvania and Ohio in the valley of the Saskatchewan. Within the isothermal lines that inclose the zone west and northwest of Minnesota, which is being or is soon to be opened to cultivation, lies a vast area of fertile lands from which might easily be cut out a dozen new States of the size of New York." *

At Fort Vermilion, 58° 24' N. and 116° 30' W., Professor Macoun found barley cut on August 6th, 1875, and wheat almost ripe, and this, he it is observed, in a latitude coincident with that of the extreme north of Scotland. In Blodgett's 'American Climatology' it is stated that the buffalo winters on the upper Athabasca at least as safely as in the latitude of St. Paul, Minnesota, and the spring opens at nearly the same time along the immense series of plains extending northward from the city of St. Paul to the Mackenzie River. Again, meteorological observations show that Winnipeg and Fort McLeod, 600 miles apart, but in the same latitude, have about the same temperature, while Fort

* J. W. Taylor, United States Consul at Winnipeg. Quoted in Macoun's 'Manitoba and the Great North-West,' p. 162.

Simpson, 770 miles due north of Fort McLeod, is warmer. To understand thoroughly the climate of the North-West we must pass beyond the artificial boundary at the south of the Dominion. On the other side of this line (lat. 49°) there is, in the United States territory, a vast region of arid country, covering an area of about half a million square miles, and occupying a general elevation of about six thousand feet. Over this, the Great American Desert, as it is called, the moisture-laden winds flowing northward from the Gulf of Mexico, have to pass on their way to the Canadian prairies—"south-west winds come across the dry, hot plains west of the Mississippi." * Any cause which tends to reduce the temperature of the atmosphere thereby lessens its capacity for moisture, so that when an atmospheric current is sufficiently cooled, its vapour is usually precipitated in the form of rain. But, in summer time, the heat arising from the burning plains of the American Desert is so great that the northward flowing air-currents retain their temperature, and therefore their moisture, and it is not till the winds encounter the cooling influence of the grass-covered plains of the prairie that their temperature becomes sufficiently reduced to allow of the precipitation of their moisture in the beneficent showers of rain which constitute so marked and so essential a feature in the meteorology of the North-West. The American desert is thus the indirect cause of the summer showers of the prairie, as, were it not for this desert, the air currents from the south would probably be deprived of their moisture long before they reached the North-West. But this same desert is in winter the cause of that dryness of the atmosphere which renders the winter climate of the prairie so much less trying than it otherwise might be, for at this season the "suspension of those desert effects which gave the summer rains," in other words, the cooling of the desert, induces the main air-currents from the Gulf of Mexico to trend to the east. This change of direction takes them over the region of the great lakes, where they deposit an abundant rainfall.†

"*Bad Lands.*"—The area within which is comprised what I have referred to under the name of the Great American Desert is not described as "desert" by the American geographers. The region in question extends over considerable portions of the States of Nebraska, Colorado, Wyoming and Utah, between the latitude of Santa Fé (36° N.) and that of Cheyenne ($41\frac{1}{2}^{\circ}$ N.), and between the meridians of 99° and 111° W. Much of it is occupied with what are known as "bad lands," and it is these, with their arid climate and scant vegetation, which impart the desert character. They also extend around the Uinta Mountains,

* Ansted, 'Phys. Geogr.,' Fifth Ed., p. 295.

† 'Manitoba and the Great North-West,' p. 150.

in latitude 41°, due east of Salt Lake City, and in this locality were traversed by the original settlers in that city before their eyes were gladdened with a sight of the "promised land." I cannot do better than let the American geologists describe these "bad lands" in their own words:—

"In the arid region of the western portion of the United States, there are certain tracts of country which have received the name of *mauvaises terres*, or bad lands. These are dreary wastes—naked hills, with rounded or conical forms, composed of sand, sandy clays, or fine fragments of shaly rocks, with steep slopes, and, yielding to the pressure of the foot, they are climbed only by the greatest toil, and it is a labour of no inconsiderable magnitude to penetrate or cross such a district of country.*

"The vast plains to the west of Cheyenne are covered with the drab-yellow and light-gray sands, marls, and clays of the great freshwater lake deposit, known as the 'bad lands.'"†

And Dr. S. Aughey, in his report on the superficial deposits of Nebraska, describes the bad lands in a manner which I have only space to briefly summarise. He says they do not really belong to the surface deposits, as they constitute a peculiar formation, where most of the soil capable of being cultivated has been removed by denudation. They belong to what Hayden calls the White River group of Tertiary rocks, and are believed to be of Miocene age. The materials of the deposits are white and yellowish indurated clays, sands, and marls, with occasional thin beds of lime and sandstones. "The geologist never tires of investigating these deposits and their curious remains. The almost vertical sections of variously-coloured rock have been chiselled by water agencies into unique forms. Indeed, viewed from a short distance they remind the explorer of one of those old cities which only exhibit their ruins as reminders of their ancient greatness. Among these grand desolations, the weird, wild old stories of witchery appear plausible and possible. It is in the deep cañons at the foot of stair-like projections that the earliest of those wonderful fossil treasures are found which have done so much to revolutionise our notions of the progress of life and of Tertiary times." "Agriculture in such a region as this," adds Dr. Aughey, "where often nothing is now growing, is, of course, out of the question. Whether there ever will be such an increased rainfall as to start vegetation in this region and make its surface capable of cultivation, is a problem of the future."‡

* 'Exploration of the Colorado River of the West.' Washington: Government Printing Office, 1875, p. 149.

† 'United States Geological and Geographical Survey of the Territories, for 1873.' By F. V. Hayden; Washington, 1874, p. 17.

‡ 'United States Geological and Geographical Survey of Colorado and Adjacent Territory, 1874.' By F. V. Hayden, U.S. Geologist; Washington: Government Printing Office, 1876, p. 262.

MANITOBA.

The Province of Manitoba is merely the frontier of the great North-West. Formerly known as the Red River Settlement, it was in 1870, at the close of, and as a consequence of, the Red River Rebellion, the suppression of which was effected by Colonel (now General Lord) Wolseley, raised to the dignity of a separate Province and admitted into the federation of the Dominion. Its boundaries are determined by the parallels of 49° and 53° N. lat., and the meridians of 90° and 101° W. long. It is in the very centre of North America, and, in the words of the Earl of Dufferin, "may be regarded as the keystone of that mighty arch of sister Provinces which spans the Continent from the Atlantic to the Pacific." Its area, 123,000 square miles,* is slightly in excess of that of the British Isles, 121,115 square miles; but the population of the Province is only about 125,000, of which Winnipeg, the capital, claims 30,000. This city is most advantageously placed at the confluence of the Red and Assiniboine Rivers, occupying the site of the old Fort Garry, one of the head-quarters of the Hudson's Bay Company, and though the fort is now unfortunately destroyed, its name will linger in history as that of the place where the insurrection of the French-Indian half-breeds culminated, under the leadership of Louis Riel, in the Red River Rebellion of 1869-70. The great obstacle to the growth of Winnipeg, and with it the development of Manitoba, arose from its inaccessibility. The country between Lake Superior and the prairie metropolis has already been described, and it occupied Colonel Wolseley and his troops three months (May to August, 1870) to traverse this region, whereas the journey across the same district, from Port Arthur to Winnipeg, is now accomplished by the Canadian Pacific Railway in less than twenty-four hours. The first railway communication with Winnipeg was effected in the spring of 1879 through American territory, viâ Chicago, and the St. Paul, Minneapolis, and Manitoba Railway, and this at once gave an enormous impetus to business enterprise. But it was not till the winter of 1883 that the railway between Port Arthur and Winnipeg was completed, and then, for the first time in history, it was possible to gain railway access to Winnipeg without leaving Canadian territory.

"The chief rivers emptying into Lake Winnipeg are the Winnipeg, the Red, and the Saskatchewan. The Assiniboine River, navigable from 250 to 350

* By a recent decision, however, of the Judicial Committee of the Privy Council, an extensive area of land, lying to the north and north-west of Lake Superior, the possession of which was disputed by the Provinces of Manitoba and Ontario has been awarded to the latter.

miles for steamers of light draught, enters the Red River 45 miles from Lake Winnipeg, and at the confluence of the rivers ("the Forks") is situated the city of Winnipeg. The Winnipeg, which flows from the territory lying south-east of Lake Winnipeg, is a noble river some 200 miles long, that after leaving the Lake of the Woods, dashes with its clear water over many cascades, and traverses very beautiful scenery. At its falls from the Lake of the Woods is one of the greatest and most easily utilised water-powers in the world (at Rat Portage). Like most rivers in the New World, the Red River is at intervals of years subject to freshets. In the 70 years' experience of the Selkirk colonists there have been four "floods." The highest level of the site of the city of Winnipeg is said to have been under 5 feet of water for several weeks in May and June in 1826, under 2½ feet in 1852, not covered in 1861, and only under water on the lowest levels in 1882. The extent of overflow has thus on each occasion been less. The loose soil on the banks of the river is every year carried away in great masses, and the channel has so widened as to render the recurrence of an overflow unlikely. The Saskatchewan, though not in the Province, empties into Lake Winnipeg less than half a degree from the northern boundary. It is a mighty river rising in the Rocky Mountains, and crossing 18 degrees of longitude. Near its mouth are the Grand Rapids. Above these, steamers ply to Fort Edmonton, a point upwards of 800 miles north-west of the city of Winnipeg. Steamers run from Grand Rapids, through Lake Winnipeg, up Red River to the city of Winnipeg."*

At the time of the Rebellion, in 1870, the population of Winnipeg was 300; eleven years later it had risen to 9000; in the following year, 1882, it rose to 21,000, and there are now 30,000 inhabitants. The total annual assessment of the city in 1878 was 670,000L., whereas last year it had risen to 7,600,000L., and the preceding year it was even higher. In fact, the opening up by railways of the vast territory of which Winnipeg is, and must continue to be, the head-quarters, led to a "boom" amongst speculators, the reaction from which is still felt, though happily it is dying away.

If a stranger should happen to be in Winnipeg on a wet day, as it fell to my lot to be, he will carry away with him a memento of the city which is likely to make a lasting impression, if not on his mind, at least on his garments. I know in my case it did. It is the Winnipeg mud. Most of the roads are rivers of mud when the weather is wet, and the oxen in the Red River carts, and the unfortunate horses, seem quite accustomed to stand shoulder-deep in the mire. As I was out and about all day long, I received a very liberal plastering of that mud. I had it operated on in Toronto, in Montreal, in Quebec, in Halifax, in St. John, in Boston, in New York, till the cents began to mount up into dollars, and still that mud clung. In Liverpool, and again in London, the attack was renewed, but the indelible stains remained. Baffled and disheartened, I abandoned the struggle—I abandoned the garments too. It was suggested to

* 'Encyc. Brit.,' Ninth Ed., 1883, Art. "Manitoba."

me that the slime in the roads afforded strong indications of the fertility of the soils in the Red River valley, but the illustration is one that might profitably be dispensed with. The condition of its roads is a reproach to Winnipeg, but it is one which its enterprising citizens will no doubt soon make a thing of the past.

I have spoken of the Red River cart, a remnant of bygone days. The Marquis of Lorne says * :—

"It is a very rough structure, but ingeniously made, for its wheels are put together without one piece of iron. There is neither nail nor metal tire.

Fig. 1.—The Red River Cart.

(From 'Canadian Pictures,'—by permission.)



The thing creaks horribly, but answers its purpose well. Caravans of these conveyances have for the last thirty years taken the half-breed's goods by the prairie trails to all parts of the great valleys, and often occupy 90 days in getting to Edmonton."

The word Manitoba means the land of the great spirit, and is of Indian origin. In pronouncing the word, the dwellers in the Province, I noticed, place the accent on the third syllable, and not on the last, as is sometimes heard in England. The tide of emigration to this Province during the last six or eight years has made the name very familiar to English agriculturists, and in the course of an eloquent address upon Manitoba by the Earl of Dufferin, during his tenure of the office of Governor-General

* 'Canadian Pictures,' p. 136.

of Canada, on the occasion of his Lordship's visit to Winnipeg, in August, 1877, the following words occur:—

"It was here that Canada, emerging from her woods and forests, first gazed upon her rolling prairies and unexplored North-West, and learnt, as by an unexpected revelation, that her historical territories of the Canadas, her eastern seabords of New Brunswick, Labrador, and Nova Scotia, her Laurentian lakes and valleys, corn lands and pastures, though themselves more extensive than half-a-dozen European kingdoms, were but the vestibules and ante-chambers to that till then undreamt of Dominion, whose illimitable dimensions alike confound the arithmetic of the surveyor and the verification of the explorer.

"It was here that, counting her past achievements as but the preface and prelude to her future exertions and expanding destinies, she took a fresh departure, received the afflatus of a more imperial inspiration, and felt herself no longer a mere settler along the banks of a single river, but the owner of half a continent, and in the magnitude of her possessions, in the wealth of her resources, in the sinews of her material might, the peer of any power on the earth."

The reason that Manitoba remained so long unnoticed, and practically unknown by the outer world, was undoubtedly the difficulty of getting to the Province. Viscount Milton and Dr. Cheadle, writing some six or seven years previous to the Red River Rebellion, observed * :—

"The farmers of Red River are wealthy in flocks, and herds, and grain, more than sufficient for their own wants, and live in comparative comfort. The soil is so fertile, that wheat is raised year after year on the same land, and yields 50 and 60 bushels to the acre, without any manure being required. The pasturage is of the finest quality, and unlimited in extent. The countless herds of buffalo which the land has supported are sufficient evidence of this. But, shut out in this distant corner of the earth from any communication with the rest of the world—except an uncertain one with the young State of Minnesota by steamer during the summer, and with England by the Company's ship which brings stores to York Factory, in Hudson's Bay, once a year—the farmers find no market for their produce."

And it is possible that some of the soldiers who served in the Red River Expedition regret they did not seize the opportunity which, according to the following remarks of the Marquis of Lorne, was offered to them † :—

"Many speak as though the experience of farming in the province of Manitoba dated only from yesterday; but this is not the case, for Lord Selkirk many years ago brought in a colony consisting of Scotchmen from his estates in the north, taking them by Hudson's Bay up the Nelson River to Lake Winnipeg, and then settling them not far from where the present city stands (then called Fort Garry), at a place named Selkirk. It is curious how few of the members of that force under Sir Garnet Wolseley, which put down the half-breed insurrection in 1870, seem to have been sufficiently impressed by the experience of the Selkirk settlers, for the soldiers were not desirous to take

* 'The North-west Passage by Land,' p. 39.

† 'Canadian Pictures,' p. 187.

up the land allotment which was offered to every member of the expeditionary corps. Yet if they had remembered how the early pioneers had told them that the wheat grown on their lands came to a total of about 30 bushels per acre in each year, and that these corps were raised giving the land a time of rest every fifth year only ; if they could have realised within how short a time those places which they themselves had reached with so much toil by march and canoe portage, through woods and endless lakes, would not only be reached by railways, but become great railroad centres, they would not so carelessly have thrown away their chance of making a fortune. When I was at Winnipeg in 1881 the city had scarcely 10,000 people ; now it has 80,000. The streets are full of life. Excellent shops, large warehouses, and some handsome churches have been erected. The great want is a good pavement, for the soil is a tenacious black stuff, which clogs and sticks to everything it touches after rain. Fortunately it soon dries, and in the neighbourhood of the town the prairie sod gives good surface for anything but heavy traffic."

The provincial authorities in Manitoba are acting wisely in fostering and guiding the development of agriculture. The periodical and other publications issued under the authority of the Minister of Agriculture, Statistics, and Health, are very useful, and, provided the farmers of Manitoba will study them, cannot fail to prove of excellent service. The 'Manual of Acts and Orders in Council relating to the Department of Agriculture, Statistics, and Health,' issued in 1884, indicates very clearly the kind of bureaucratic control which guides the progress of agriculture. It is enacted that all that part of the administration of the government of Manitoba which relates to agriculture, immigration, statistics, and the public health, including hospitals, shall be under the control of the Department, which shall be administered and managed by the Minister, who may decide all matters of doubt or dispute as to the construction or working of the Act, his decision being final, except that an appeal may be made to the Lieutenant-Governor-in-Council. It is the duty of the Department to institute inquiries and collect facts and statistics relating to agricultural, manufacturing, or other interests of the Province, to adopt measures for circulating and disseminating the same in such manner and form as may be found best adapted to promote the progress of the Province, and to encourage immigration from other countries. Certain persons are bound under a penalty of 4*l.* to furnish information to the Department when such is asked for ; they comprise all officers of the Board and Council, the officers of all electoral division agricultural societies, continued or organised under the Act, and of all municipal councils, school boards, boards of trade, and other public institutions, railway, navigation, and other incorporated companies, and all public officers of the Province, and all medical practitioners and veterinary surgeons ; they are required from time to time to collect and tabulate facts according to instructions to be furnished them from the Department, and

to make diligent efforts to supply correct information on all questions submitted to them.

The special agricultural functions of the Department are entrusted to the Board and Council of Agriculture. The Board is composed of one representative from each electoral division, appointed by the Lieutenant-Governor-in-Council from among the agriculturists of note in the Province. They are entitled to no compensation for services other than for expenses occasioned by presence at meetings of the Board or Council, the sum for which is fixed by the Lieutenant-Governor-in-Council. Seven form a quorum, and a meeting for the despatch of business must be held on the third Wednesday of February in each year, in Winnipeg. Special meetings are held when extraordinary circumstances arise to necessitate such. A member absent from two consecutive meetings forfeits his membership, unless excused from attendance by resolution of the Board passed at the second meeting from which he may be absent. The duties of the Board are to advise the Department on all matters relating to the agricultural interests of the Province; to organise agricultural and industrial exhibitions open to competition from all parts of the Province; to arrange, when practicable, for the representation of the products of the Province at exhibitions in other provinces or in other countries; to supervise the management of electoral division agricultural societies, and generally to adopt every means possible to promote improvement in the agricultural interests of the Province. The Board may, subject to the approval of the Lieutenant-Governor-in-Council, pass bye-laws to regulate its proceedings, and for other purposes not inconsistent with the provisions of the Act.

The Council of Agriculture consists of six members of the Board elected at each annual meeting by ballot. They have full power to act for and on behalf of the Board, and all grants of money, subscriptions, or other funds, made to or for the use of the Board, are expended under their direction. They meet as circumstances may require, at the summons of the Secretary-Treasurer of the Board, under orders from the Minister or President of the Board. Three form a quorum, and vacancies in the Council are filled by the remaining members thereof. Absent members are dealt with on the Council the same as on the Board. The President and Vice-President of the Board are elected by ballot from among the members at each annual meeting. They are *ex-officio* members of Council, and the President or, in his absence, the Vice-President, presides at all meetings of the Board and of the Council. Failing both, a temporary chairman is elected from among the members present.

The Board may establish, carry on, and manage a veterinary college for the instruction of pupils, by competent and approved teachers in the science and practice of the veterinary art, and may arrange for the examination of such pupils in anatomy, physiology, materia medica, therapeutics, chemistry, and as to the breeding of domesticated animals; and, upon proof to the satisfaction of the Council, that such pupils possess the requisite qualifications, may grant diplomas under the seal of the Board, and the signature of the President and Secretary-Treasurer thereof, certifying that they are competent to practise as veterinary surgeons. A register is kept of veterinary surgeons practising in the Province, and any person acting as a veterinary surgeon without being duly qualified is liable to a fine of from 4*l.* to 20*l.*

The Council must authorise the organisation of an agricultural society in any electoral division in which there may not be one in existence, after a petition—signed by at least fifty persons, each of whom must have actually paid in to the secretary-treasurer *pro tem.* not less than one dollar (4*s.* 2*d.*),—has been filed in the Department in the form set forth in the Act. The objects of such societies are generally to promote the progress of agriculture by holding exhibitions at which prizes may be awarded for live-stock, agricultural and horticultural products, implements, and machinery; and for any excellence in agricultural productions or operations, by importing or otherwise procuring seeds, plants, and pedigree animals of new and valuable kinds, or by offering bonuses for the introduction of the same; by offering prizes for essays on questions relating to agriculture, arboriculture, or horticulture; by promoting the circulation of agricultural, arboricultural, and horticultural publications; and by holding meetings for discussion, and securing the delivery of lectures on subjects connected with agriculture, arboriculture, or horticulture.

The protection of game comes within the functions of the Department, and an enumeration of the close times will carry with it an indication of the animals included in the restrictions. None of the following are to be shot at, hunted, trapped, taken or killed within the times specified: (a) All kinds of deer, including cabri or antelope, elk or wapiti, moose, reindeer or cariboo, or the fawns of such animals, between January 1 and October 1. (b) The varieties of grouse commonly known as prairie chicken, or pheasants, and partridges, between January 1 and September 1. (c) Woodcock, plover, snipe, and sandpipers, between January 1 and August 1. (d) Any kind of wild duck, sea-duck, widgeon, teal, wild swan or wild geese, except the variety of wild geese commonly known as snow

geese or wavyas, between May 1 and August 15. (e) Otter, fisher or pekan, beaver, muskrat and sable, between May 15 and October 1. (f) Mink and marten between April 15 and November 1. No person is allowed to hunt with dog, gun, net or otherwise, within the enclosed grounds or lands of another without first obtaining permission from the owner, agent, or occupant of such grounds or lands. In order to encourage persons who have imported, or may import, different kinds of game with the desire to breed the same on their own lands, no person is allowed to hunt, shoot, kill or destroy any such game without the consent of the owner of the property wherever the same may be bred. Most of the wild birds are protected by law against capture, destruction, or injury, and, excepting the birds whose close times have already been enumerated, it is illegal to take, kill, or injure any birds save the following, which are unprotected: eagles, falcons, hawks, owls, wild pigeons, blackbirds, kingfishers, jays, crows, ravens, snow buntings or snow birds, shrikes, bitterns, curlews, cranes, grackles, cormorants, gulls, mergansers, pelicans, and loons. The penalty for infringing any of the bye-laws for the protection of game is a fine of from 2*l.* to 10*l.*, and costs.

To assist in carrying out the stringent regulations relating to the diseases of animals, the Lieutenant-Governor-in-Council appoints, from time to time, as officers of the Department, one or more veterinary surgeons qualified to practise in the Province, and each person so appointed is known as a district veterinarian, because he has a certain district assigned to his jurisdiction. Any such veterinarian may at any time enter any common, field, stable, cowshed, or other premises where he has reasonable grounds for supposing that any animal affected with infectious or contagious disease is to be found. The penalty for impeding or obstructing such entry is a fine of 20*l.* The veterinarian, considering a place to be infected, sends, with all speed, a copy of his certificate to the Department; and if it appears that contagious or infectious disease exists, as declared by the veterinarian, the Minister may so determine and declare, and may prescribe the limits of the infected place, and may from time to time extend or curtail such limits by means of notice in the 'Manitoba Gazette.' If any animal, hide, skin, hair, wool, horn, hoof, offal, carcass, meat, dung, hay, straw, litter or other thing, is moved in contravention of the rules with respect to infected places, the offender is liable to a fine of 20*l.* A similar penalty is incurred by any owner, breeder, or dealer, or by any veterinary surgeon who, on perceiving the appearance of infectious or contagious disease, fails to give immediate notice in writing to the Department at

Winnipeg, and to the veterinarian for the district. A like penalty is inflicted on persons who expose infected animals, or the remains of such animals, and on persons who violate such regulations for quarantine as may be made by the Lieutenant-Governor-in-Council. In cases in which animals are ordered to be slaughtered a compensation amounting to two-thirds the value of the animal may be claimed, but such value is in all cases to be determined by the Minister; while if the owner or his representative has been guilty of an offence against any of the provisions of the Act, no compensation is allowed. Any horse or other animal affected with glanders or farcy is to be destroyed, and the carcass burnt or buried to the satisfaction of the district veterinarian. Every steamboat, railway and other company, and every person carrying animals for hire in the Province, must thoroughly cleanse and disinfect, in such manner as the Lieutenant-Governor-in-Council may from time to time direct, all steamers, vessels, boats, pens, carriages, trucks, horse-boxes and vehicles used by such company or person for the carrying of animals. In the case of non-compliance a fine of 20*l.* is incurred.

It is easier to prevent the spread of noxious weeds in a new country than in one where the soil has been long under cultivation, but even in a new country it is difficult unless there is concerted action over a wide area. This, however, is the case in Manitoba, and it may perhaps surprise English farmers to know that there every owner or occupier of land must cut or cause to be cut down, or otherwise destroyed, all wild mustard, wild oats, and Canada thistles growing thereon, so often in each and every year as is necessary to prevent their going to seed; and if any owner or occupier of land allows any such wild mustard, wild oats, or Canada thistles to grow thereon and the seed to ripen so as to cause or allow the spread thereof, he is liable to a fine of from 2*l.* to 5*l.* for every such offence. Public roads and highways are placed under the charge of overseers or pathmasters appointed by the Municipal Councils before March 1st each year; and if any Municipal Council fails to make the necessary appointments these latter are made by the Minister, and the funds of the municipality charged with the cost. Besides clearing the highways, the pathmaster watches all lands within his district, and gives notice to the owner or occupier of any land whereon it is apparent that the weeds specified need cutting. If such weeds are not cut within five days the responsible party is fined, as already mentioned, and is further mulcted in the sum of 1*l.* for every day after the five during which the weeds may be neglected. Station-masters are similarly responsible for weeds on railway

property, after being notified by the town clerk. Unoccupied lands are cleared of weeds by the overseer or pathmaster, and the owner is bound to pay such expenses as are thereby incurred. The overseers or pathmasters are subject to the control of one or more inspectors of noxious weeds appointed by the Minister. Seed merchants are not exempt from the law, for it is enacted that any person who vends for seed purposes any grain, grass, or other seed among which there is any seed of wild mustard, wild oats, or Canada thistles, shall be liable to a fine of not less than 2*l.*, nor more than 20*l.* Wild mustard, I may observe, is identical with the charlock of arable lands in England, and this weed-pest was introduced into Canada from Europe, and is there finding its way into all cultivated lands. The Canada thistle, *Carduus arvensis*, is, despite its name, another naturalised plant which has become a pestilent weed on all badly cultivated farms, and in Ontario it renders some of the country roads almost impassable in summer; it is a common weed in England, growing to a height of from two to four feet, and distinguished by its dingy purple flowers and more or less cottony stem. The term "wild oats" is vague, and probably includes several objectionable grasses, of which *Avena fatua* may possibly be one; on the western prairies, however, the name is given to one of the most valued of the buffalo grasses.

Last summer the Department of Agriculture of Manitoba issued a monthly Crop Bulletin, embodying a summary of the reports returned to the Department in accordance with a regulation already referred to. These bulletins, which are highly creditable productions, are prepared by the Deputy Minister, Mr. Acton Burrows, and addressed by him to the Minister of Agriculture, Statistics, and Health, at present the Hon. A. A. C. La Riviere, M.P.P. Each bulletin opens with a report on the weather, embracing a series of observations on the meteorology of the preceding month. This is followed by reports on the progress and prospects of field crops, given under such heads as wheat, oats, barley, potatoes, field roots, hay, general prospects, with notes on pests and noxious weeds, succeeded by reports on live-stock, under the heads of horses, cattle, sheep, pigs, and poultry; and further information is given on such subjects as wild bees, labour, prairie fires and timber. The bulletin is usually supplemented with a summary of the agricultural prospects in the United States and the United Kingdom. In the circulars sent out by the Department, and from the replies to which the bulletin is made up, correspondents are asked to describe the weather, mentioning generally the rainfall, temperature, &c., and suitability for growth and harvest; to state generally the quality of the hay crop, and the condition in

which it was saved, with the total quantity saved, and the average tonnage per acre of prairie grass and of cultivated grasses and clovers respectively; to give the dates of the beginning and ending of harvest, with the average yield per acre in bushels, and comparative quality of each of the respective grains,—wheat, barley, oats, flax and peas; to state generally the quality of the grains and the extent to which they have been injured, if at all; to give the respective average dates at which the following varieties of wheat, viz., Red Fyfe, White Fyfe, White Russian, Golden Drop, and Lost Nation ripened, and the average yield per acre of each; to state generally the condition of field potatoes and roots, and their probable quality, with the probable yield per acre; to state whether the supply of farm-labourers had been equal to the demand or not; to report on native hops growing wild, as to whether they were picked and sold, and with what success, and if hop-growing could be made a paying industry in Manitoba; to name the principal varieties of fruit growing wild, whether they were plentiful or scarce, and what fruits had been cultivated, and the success which attended them; to state whether prairie chicken and wild ducks were as plentiful or more so than last year, and if the law for their protection was generally observed; and to state if hares and rabbits were numerous, and what damage they had done. The foregoing indicate the principal topics on which information was sent to the Department in the latter half of September, and a summary of which appears in Crop Bulletin, No. 9, dated October 31, 1884. Last summer was an unusually backward one in Manitoba and the North-West, but the following figures relating to the ripening and yield of wheat in the Province should, nevertheless, prove interesting:—

VARIETY OF WHEAT.	Average Date of Ripening.	Average Yield in Bushels per Acre.
Red Fyfe	August 28	22·48
White Fyfe	August 29	24·00
White Russian	September 3	25·88
Golden Drop	August 27	23·18
Lost Nation	September 4	25·88

For the entire Province the average date at which cutting began was August 27, and ended September 28, while stacking ended October 3; average yield 22·31 bushels per acre. Percentages of loss, and the causes, were estimated as follows:—rain, ·0146; hail, ·0033; frost, ·0132; rust, ·0001; smut, ·0036; sprouting, ·0063; shrinkage, ·0152. A large percentage of loss

arose from grain being cut in a partially unripe condition, the result of uneven growth and the fear of early frosts. In the eastern districts the loss arose principally from rain, which shelled out much of the grain standing ripe, and caused that which was cut and stacked to sprout. Fears of an occurrence of early frost caused much wheat to be cut in an unripe condition, and consequently a large percentage of loss from shrinkage was observable.

The educational value of these bulletins can hardly be over-estimated. In the October issue the farmers of Manitoba are plainly told that, so far as the wheat crop is concerned, they will have to wake up in many respects, and make themselves acquainted with the requirements necessary to render wheat-growing a sure and profitable source of husbandry. The necessity for the autumn ploughing of wheat land is insisted upon. In every case in which wheat was sown as early as practicable in 1884, on land that was prepared in the fall of 1883, the crop was not hurt either by frost or rain. Moreover, the crop had the advantage of the moisture contained in the ground, which served effectually to counteract the drought which prevailed in the latter part of May and the beginning of June. On the other hand, the later-sown part of the crop after spring ploughing, through the effects of a badly-prepared seed-bed and of the drought, came up unevenly at first, and when rain came later on, a second growth started which led to uneven ripening; consequently a portion was prematurely cut, and considerable loss from shrinkage was the result. Farmers are also warned against cultivating more land than they can fairly expect to manage, as seeding of the largest possible acreage does not always imply the most successful farming. The average amount of seed wheat sown per acre in 1884 was 1.8 bushels; but there is a feeling in favour of much thicker seeding, as this would provide against immature seeds, secure the retention of moisture in the soil, prevent the growth of weeds, and promote early maturity. Wheat stools out very freely here and west of Manitoba. On the Bell Farm, and also on the experimental farms of the third prairie plateau, I noticed some extraordinary cases of tillering. Much damage arose from want of care in looking after grain that had been cut and stooked, but not stacked, during the abnormally wet harvest-time. Improper care in stacking likewise led to loss. With printed information of this kind circulating amongst the farmers, the agriculture of Manitoba ought surely to undergo a marked and rapid improvement.

In 1883, the acreage under wheat in Manitoba was 260,842. The yield, based on the returns of the threshers, gave an average-

of 21·8 bushels per acre, showing a total yield of 5,686,355 bushels. In 1884 the acreage was increased 18 per cent. viz., to 310,281 acres. Assuming the average yield to be only 20 bushels per acre, which is nearly 2 bushels below the estimated average, the total yield would be 6,205,620 bushels. Deducting from this, 6 bushels per head of the population for consumption and 2 bushels per acre for seeding, the balance for exportation, 4,746,058 bushels, falls less than a million bushels short of the total yield of 1883. These figures convey some idea of the increase in the production of wheat which is taking place in the Province.

As the terms used to denote the qualities of Canadian wheat are now to be frequently seen in English newspapers, it may not be out of place to enumerate here the Manitoba standards for grain as defined by the Chief Grain Inspector of the Province:—

“No. 1, **HARD SPRING WHEAT.**—Shall be Red Fyfe wheat, containing not more than 10 per cent. admixture of softer varieties; must be sound, well cleaned, and weigh not less than 60 lbs. to the measured imperial bushel.

“No. 2, **HARD SPRING WHEAT.**—Shall be Red Fyfe wheat, containing not more than 10 per cent. admixture of softer varieties; must be sound, reasonably clean, and weigh not less than 58 lbs. to the measured imperial bushel.

“No. 1, **SPRING WHEAT.**—Must be sound, well cleaned, and weigh not less than 60 lbs. to the measured imperial bushel.

“No. 2, **SPRING WHEAT.**—Must be sound, reasonably clean, and weigh not less than 58 lbs. to the measured imperial bushel.

“No. 3, **SPRING WHEAT.**—Shall comprise all wheat fit for warehousing, not class enough for No. 2, and weighing not less than 56 lbs. to the measured imperial bushel.

“**REJECTED SPRING WHEAT.**—Shall comprise all wheat fit for warehousing, but too low in weight, or otherwise unfit for No. 3.

“**NOTE A.**—All good wheat which is slightly damp shall be reported ‘no grade,’ with the inspector’s notation as to quality and condition.

“**NOTE B.**—All wheat that is in a heating condition, or too damp to be considered safe for warehousing, or that has any considerable admixture of foreign grain or seeds, or is badly bin-burnt, whatever grade it might otherwise be, shall be reported ‘condemned,’ with inspector’s notation as to quality and condition.

“**NOTE C.**—Wheat containing any admixture of ‘goose wheat’ shall be graded ‘rejected.’

“**NOTE D.**—Wheat containing smut or sprouted kernels, in however slight degree, shall in no case grade in its class as high as No. 1.”

With this classification before them, wheat-growers are encouraged to so clean and prepare their grain that the sample may grade as high as possible, and so command better prices. As the term “goose wheat” in Note C. may prove puzzling to the reader, I may add that this name is given to a very leafy grass-like plant which produces abundance of grain. The grains are highly translucent, and have the appearance of very large, well-

formed, sharp-pointed grains of rye, with a well-defined groove or furrow. But it is too large and shapely for rye. Professor Macoun informs me by letter that it was first cultivated, and is still grown, at Edmonton, on the North Saskatchewan, and that the grain originally sown was obtained from the crop of a wild goose some twelve years ago. He inclines to the opinion that it came from Alaska, or from some Russian settlement across Behring's Strait, and adds that wild geese invariably take to the corn stubbles on their way from the north in autumn. The Edmonton farmers call it "wild goose barley." I have a few grains in my possession and hope to raise some plants, and thus get an opportunity of examining "goose wheat" more closely.

The following figures show the acreage and yield of barley during the last two years in Manitoba :—

	Acreage.	Bushels per Acre.	Total Yield. ¹
1883	60,281	30.00	^{Bushels.} 1,808,430
1884	40,936	32.83	1,313,928

The acreage in 1884 thus shows a falling off of over 31 per cent. as compared with 1883, and the yield is 464,502 bushels less. The reasons assigned are the want of railway facilities in some districts, and the unsatisfactory state of the markets in 1883. The average dates of harvesting barley in the backward season of 1884 were:—cutting began August 26, ended September 11; stacking ended September 28.

Similar information about the oat crop is given in the following table :—

	Acreage.	Bushels per Acre.	Total Yield.
1883	215,431	44.00	^{Bushels.} 9,478,964
1884	128,487	39.67	5,107,079

The falling-off last year is attributed to the unsatisfactory prices which were obtainable for the surplus grain in 1883, and in many cases to the distance from market. Oats sown on spring breaking of the sod were necessarily put in late, and, as a consequence, the crop incurred damage. All information collected last year points to the conclusion that oats, and barley too, must be sown early to be successful, and until this point is strictly attended to satisfactory results cannot be expected.

The quality of the root crop of 1884 was excellent, but turnips suffered early in the season from the attacks of grubs and flies. It is much to be hoped that the enterprising Board of Agriculture of Manitoba will ere long estimate the yield of roots in tons instead of bushels per acre. As it is, I can only give the average yields in bushels per acre, viz., of potatoes, 201; turnips, 392; mangolds, 356; carrots, 223; beets, 275. Turnips are usually estimated at 60 lbs. to the bushel. The respective acreages were: of potatoes, 8847; turnips, 1585; mangolds, 275; carrots, 200; beets, 120—in all cases a falling off as compared with 1883.

Of prairie hay in Manitoba there was cut, in 1884, a total weight of 226,854 tons, the average yield being 1.72 tons per acre. Of cultivated grasses and clovers the total tonnage was 7087, and the average yield 1.25 tons per acre.

The following averages relate to peas and flax in 1884 :—

	Harvest Began.	Ended.	Yield in Bushels per Acre.
Peas	August 25	September 14	22
Flax	September 7	September 22	16

Native hops grow wild in every county of the Province, and are the only variety used by settlers. I saw some excellent samples at the Manitoba Exhibition, held at Winnipeg, in September, 1884. The general opinion is that the cultivation of hops might be made successful so far as yield and quality are concerned, but the questions of a market and the cost of labour have yet to be considered. The native variety is of such excellent quality that it is thought its improvement by cultivation would probably be attended with more success than the introduction of ordinary cultivated varieties from Ontario or elsewhere. It is feared that the high winds which frequently prevail on the prairies might interfere with the cultivation, and the open prairie would certainly not be suitable for hop fields, properly sheltered grounds being absolutely necessary.

Though Manitoba abounds in wild fruits, the cultivation of fruit is nevertheless receiving increasing attention. The wild varieties comprise strawberries, black and red raspberries, black and red currants, high and low bush cranberries, saskatoon berries, gooseberries, red and black cherries, red plums, blueberries, whortleberries, juneberries, grapes, and hazel nuts. Of these, only the saskatoon berries will appear

unfamiliar to the English reader; they are the fruit of certain rosaceous plants, *Amelanchier alnifolia* and *A. Canadensis* var. *oblongifolia*, allied to the medlar, the apple, and the pear. The cultivated fruits are chiefly currants, gooseberries, strawberries, raspberries, plums, apples, and crab-apples; those most extensively and most successfully grown being currants, gooseberries, and strawberries. Apples have not succeeded very well, owing, doubtless, to the fact that the trees have generally been selected from more southern latitudes. Standards are, therefore, now being imported from Russia, and it is expected that these will yield better results. Raspberries, though less widely cultivated than gooseberries and strawberries, have given encouraging results. Plums, grapes, and crab-apples are not at present so widely spread, nor so successfully grown.

The law as to the destruction of noxious weeds is reported as being carefully carried out. Wild buckwheat seems to be very prevalent; this plant is, I believe, identical with the black bindweed, *Polygonum Convolvulus*, of English cornfields. Lamb's quarter, similar to our dock, and wild sunflower are also troublesome; while corn cockle, mustard, wild oats, and Canada thistles abound, and would speedily become an oppressive evil but for the steps taken for their continual suppression.

Stock-raising, in connection with grain-growing, is steadily increasing, though want of railway communication and of suitable markets act as a check in some districts of the Province. Horse-breeding has made a fair start, and a large number of foals were dropped last spring. Besides native horses there were returned, as in the Province last summer, 13,493 horses, in addition to 168 stallions, and they are classified under the following heads:—French Canadian, Clydesdale, Coach, Mixed, Heavy Draught, Percheron, Blood, Roadster, General Purposes. Cattle-raising is greatly on the increase, and, excluding native cattle, there were in the Province last summer 45,810 head of cattle, which are arranged under the three sections of Durhams, Ayrshires, and Grades, the greater proportion belonging to the last-named group. Grade cattle are the old-established or native stock improved by crossing with English breeds, and are usually styled "Shorthorn grade," "Hereford grade," &c., as the case may be, while "high grade" or "low grade" refers to the extent to which they have been improved. Two or three crosses of English blood would probably produce high grade stock, while the first cross would usually be low grade.

Dairy-farming is practised as far as the means of the farmers will allow. The supply of locally made butter is far in excess of the consumption in most of the townships. Very little cheese is made beyond that required for household use, although nearly all farmers appear to make it.

The number of sheep in Manitoba on July 1, 1884, was reported as 3617, distributed amongst the Merino, Leicester, Cotswold, and Southdown breeds. The number, though small, is proportional to the local consumption and to the demand for wool. It is a lack of market facilities which causes sheep-raising to be in such a backward condition. The correspondents of the Board of Agriculture are unanimous in their opinion that sheep-farming could be made to pay, and it is claimed that the extensive pastures of good grass, the rich dry soil and dry air, the temperate summer climate, and the absence of rain or sleet storms in the winter, would all favour the breeding and maintenance of ovine stock. Assuming that the prairies in their wild state are capable of maintaining three sheep per acre, and an equal or larger number after seeding with cultivated grasses, a great prospect is opened up for the near future, and an extension of sheep-farming would carry with it the advancement of agriculture, involving the best means of cultivation for raising large quantities of cheap roots and green crops. One drawback is suggested by the difficulty of keeping sheep fenced in and confined to their respective farms, as wire fencing, the kind most generally in use, is very detrimental to the wool. But appropriate branding of the fleeces and the use of sheep-dogs would go a long way to remove this difficulty, which certainly looks less formidable than that of the winter management of the flocks, for, with a foot or more of snow on the ground, housing of some kind would appear to be necessary.

On July 1, 1884, the number of pigs in Manitoba was returned as 32,701, arranged under the heads of Berkshire, Suffolk, Yorkshire, Chester, and Poland China. The number of thoroughbreds is rather limited as yet. Every farmer, as far as possible, keeps enough pigs for his own use, but in several districts very little pork is raised beyond the requirements of home consumption. As railway and market facilities increase, pig-breeding will no doubt become more prevalent, and it is even hoped to make Winnipeg such a centre of the pork industry as Chicago, a thousand miles to the south-east, has become.

Poultry is very generally kept in Manitoba, and with every success. Fowls are, as might be expected, the most numerous, and are in many instances kept in very large flocks; turkeys, geese, and ducks are also profitably maintained. Special means are necessary for housing in the winter, either underground houses or cattle-sheds being used, and no losses are reported from the severe winter weather. Minks, foxes, weasels, and skunks often attack and sometimes destroy large numbers of fowls. The cheapness of bird food in the Province and the demand for eggs are other inducements to poultry raising.

Live-stock throughout the Province appears to be almost free from disease, and, with the exception of some isolated cases of glanders among horses, nothing was reported last summer. In the preceding winter cattle were in a few places troubled with a swelling on the jaws, which, however, disappeared with the appearance of spring. Many sows and litters were lost, owing apparently to over-feeding before farrowing, the abundance of inferior wheat on hand having been supplied to the sows not wisely but too well. Mr. Acton Burrows very significantly remarks, "the country possesses many young and inexperienced farmers who will have to make their calling a study in every respect if they expect to get on and prosper."

The total number of farmers in Manitoba last summer was 6815, and the average number of acres occupied by each was 279.

The condition of the labour market in Manitoba last July may be briefly stated. There was a good demand for labourers in many localities, particularly in the older counties. In many places help was needed from the beginning of spring work till the ending of fall-ploughing and fall-threshing, the greatest demand being during hay-making and harvesting. In a few cases help was required during the entire year, but in the more newly settled townships, where farmers are few, work is exchanged, and in this way, assisted by such implements as may be available, the harvest operations are got through without hired help. The wages paid to farm hands per month, with board, vary from 3*l.* 12*s.* to 6*l.*, the average being 4*l.* 18*s.* It is very difficult to obtain female servants on farms, their apparent desire being to get into the cities and larger towns; wages vary from 1*l.* 14*s.* to 4*l.* per month, the average being 2*l.* 4*s.*

The distribution of timber in Manitoba is very irregular. While a great many townships possess none, others have supplies capable of lasting from one or two to fifty years, and in some cases for all time, if protected from fires. Wire fencing being so generally used, comparatively little timber is required for this purpose. In several instances wood has to be drawn long distances, and in some cases the supply of wood for fuel is becoming a serious question; but, so far as Southern Manitoba is concerned, the difficulty will cease when the South-Western Branch of the Canadian Pacific Railway is extended to the Souris Coalfields. The following are the most abundant varieties of wood, named in the order of their frequency of occurrence, those that are most generally distributed being named first:—poplar, oak, ash, elm, balm of Gilead fir, maple, birch, willow, spruce, tamarac (the American larch), cherry, basswood (the American lime-tree), pine, hazel, plum, thorn, and ironwood.

The reason I have confined myself to the two years 1883 and 1884 in this brief survey of the agriculture of Manitoba is that official figures for previous years were not recorded. In fact it was not till 1882 that railway facilities rendered immigration into the Province possible on a large scale, and the organisation of the Manitoba Department of Agriculture was not commenced till the June of that year, and the first report issued by the Department bears date, March 31, 1883. But as a country covering an area greater than that of the British Isles, and possessing a soil whose wheat-growing capabilities are of world-wide fame, is far too important to be ignored by English agriculturists, it seems desirable not to omit any essential details in the history of this remarkable Province. The Department, by various means which need not be detailed, secured records of the average yields of the various crops for each of the years 1876 to 1882 inclusive, and they are embodied in bushels per acre in the following table :—

	1876.	1877.	1878.	1879.	1880.	1881.	1882.	General Average.
Wheat	32	27	26	27	29	30	32	29
Barley	42	41	36	38	41	40	37	39
Oats	51	60	60	58	58	59	51	57
Peas	32	32	34	32	38	38	..	34
Potatoes	229	304	308	302	318	320	278	294
Rye	..	30	30	40	40	35	..	35

Commenting on the yield of wheat in 1882, the first annual Report contains the following observations :—

“The harvest of 1882 has added another link to the long chain of evidence which proves Manitoba to be the premier wheat district of the world. The practical results of the threshing, giving an average yield per acre of 32 bushels, have shown that the theories previously advanced were founded on fact. Nor could it well have been otherwise, for climatologists have long since satisfactorily demonstrated that the cultivated plants yield the greatest product near the northernmost limit of their growth. Hence the perfection of wheat here, where, instead of being developed too rapidly, as is the case farther south, the undue luxuriance of the stem or leaf is restrained by the cool late spring, and the chief development of the plant thrown into the ripening period. The assertion of the distinguished American climatologist, Blodgett, ‘that the basin of the Winnipeg is the seat of the greatest average wheat product on this continent, and probably in the world,’ has been proved correct by the record of a yearly average of over 29 bushels per acre from 1876 to 1882. In Ontario, the 1882 spring-wheat crop yielded but 16·5 bushels per acre, while the three great wheat States of the American Union yielded as follows: Dakota, 16·7 bushels; Minnesota, 13·3 bushels; Iowa, 11 bushels. Minnesota is the empire wheat State of the Union. Its averages for 12 years were: 1869, 17·70 bushels per acre; 1870, 15·07; 1871, 12·28; 1872, 17·40;

1873, 17.01; 1874, 14.23; 1875, 17.05; 1876, 9.61; 1877, 16.78; 1878, 12.50; 1879, 11.30; 1880, 13.30. A yearly average of 14.51 bushels.

"The report of the Ontario Agricultural Commission, whose investigations embraced the results of years, places the general average of the Province at 11.5. In the 10 years, from 1870 to 1879, the yearly average per acre over the whole area of the United States was but 12.3. South Australia, during 9 years, averaged but 8 bushels. In Great Britain and Ireland, with high cultivation, fall wheat yielded from 1852 to 1879 an annual average per acre of $27\frac{3}{4}$ bushels of 61 lbs. per bushel, equal to $28\frac{1}{2}$ bushels of 60 lbs."

Though it appears that autumn sown wheat may succeed in sheltered places, it is spring wheat which best suits the Province; for it is claimed that not only is its average yield per acre ahead of that of any other country, but its weight per bushel is also greater, and its flour-producing qualities are unequalled. The St. Paul 'Pioneer Press,' the leading journal of the great wheat State of Minnesota, which adjoins Manitoba on the south, wrote:—

"It seems to be a settled fact that the farther north wheat is grown, up to a certain limit, the better it is. The berry obtains an amber colour, rounds out into a fulness it does not attain here, and is rich in gluten, the life-sustaining principle of flour. Some two or three years ago samples were procured from several parts of the Province of Manitoba for trial. The best of this was placed in the hands of some of our leading wheat-growers for cultivation. One variety of Red Fyfe yielded the first year at the rate of 37 bushels to the acre, of a hard amber colour, which the wheat inspector for the Millers' Association at Minneapolis pronounced the finest specimen he had seen since he had been connected with the Association."

Nor less outspoken is the opinion of another United States journal, the 'American Miller':—

"It is quite generally conceded that the best wheat-fields in the world for the production of the hard wheats so much desired in gradual reduction milling, lie partly in Minnesota and Dakota, but chiefly in Manitoba. The possible acreage of Manitoba wheat is only bounded by its settlement, and we must expect a constantly-increasing crop in that part of the Dominion for many years to come."

The testimony from these American sources may be appropriately supplemented by that of a Canadian gentleman of extensive business experience, Mr. W. W. Ogilvie, managing partner of the Ogilvie Milling Company:—

"We like Manitoba wheat because it contains more gluten than any other. This is the quality that is required to make a light loaf of bread. It is altogether in the soil, which is new, dark and deep; it has a greater depth of dark soil than any part of the United States. . . . You will get 12 lbs. more and much better bread from 100 lbs. of Manitoba wheat-flour than from Ontario wheat-flour. It will also give 2 to 3 lbs. more flour per bushel than Ontario wheat. The wheat of Ontario is every year getting weaker, and containing more starch and less gluten, so that this year (1882) we find it impossible to make good flour out of it. The element required for growing

Fig. 2.—*Harvesting on the Prairie.*

good wheat has passed out of the land, and no manuring will restore it. You may be able to grow a good yield of good-looking wheat, but it will not have gluten enough to make good bread. The same thing exists in the middle and eastern States. The sooner Ontario, like New York State, gives up growing wheat, and turns to dairy and cattle, the better. I have travelled over the wheat-fields of Europe, Asia, and Africa, and know very well all the wheat-lands of the United States except California, but I have never seen wheat-lands equal to Manitoba and the North-West Territory."

The wheat most suitable for Manitoba is Red Fyfe, and

Fig. 3.—*Prairie Farm after Three Years.*

any one who examines a sample of this grain cannot fail to notice the sub-translucent appearance it possesses, similar to that of the Ghirka wheat grown on the Russian steppes, and shipped at the Black Sea ports. Notwithstanding the prevalent idea that Red Fyfe originated in Scotland, and derived its name from the County of Fife, Mr. Sheriff Ferguson, of Kingston, Ont., the first President of the Agriculture and Arts Association of Ontario, gives another and probably correct account of its origin. A family, named Fyfe, residing near Kingston, Ont., left there in 1837, and settled between Port Hope and Cobourg,

and while there received a letter from a friend in Scotland, containing a few grains of Ghirka wheat taken from a vessel that had arrived from the Black Sea, and was discharging her cargo at Glasgow. They sowed the grains, and kept on cultivating year by year, till they obtained a sufficient quantity to carry off the first prize for spring wheat at the Provincial Exhibition at Cobourg. The grain was improved by its cultivation in Ontario, and has still further advanced in quality in its nearer approach to the northern limits of cultivation in Manitoba. This incident is further of interest in showing the value of the Provincial Exhibition as a stimulus to improvement.

The average yield of barley in Manitoba from 1876 to 1882, both inclusive, was 39 bushels per acre. The report of the Ontario Agricultural Commission places the yearly average of that Province at 25 bushels. In the decade from 1870 to 1879 the yearly average in the United States was 21·9. During the last two years the yield of barley in Manitoba—30 bushels and 33 bushels respectively—shows a falling off as compared with the average of the preceding seven years, but this may really be accounted for in part, perhaps, by the greater care with which the estimates are now made, and the more thorough collection of statistical information.

Similar remarks apply to the yield of oats. For the seven years, 1876 to 1882, the average is reported at 57 bushels per acre, whereas for the last two years the numbers have been 44 bushels and 40 bushels respectively. The Ontario Agricultural Commission reports the yearly average of that Province at 33½ bushels. In the United States the average yield for the ten years, 1870 to 1879, was 28·3 bushels.

Indian corn has been but little cultivated in Manitoba, the comparative shortness of the season and the cold spring being unfavourable to its mature growth. But when it was urged against the Province that maize could not be successfully grown, the Board of Agriculture retorted that there was no reason why it should be grown, that wheat-raising pays better, and that corn is only cultivated to-day in many of the western States of the Union because of their inability to raise wheat. This, indeed, was frankly admitted at the convention of agriculturists held at Washington, D.C., in January, 1882, under the Presidency of the United States Commissioner of Agriculture, when Mr. Blount, of Colorado, in speaking of the improvement of the cereals, said of the wheat crop of the West :—

“Wheat is full of eccentricities, made up of whims and freaks. In some sections it promises one day to make the farmer a millionaire; the next these promises are all blasted by blasted heads and rusty blades. In money value wheat is king. Every man can raise corn, but every man cannot raise wheat.”

The extension of railway communication on the prairie will not only greatly facilitate the means of transport, but will have the effect of developing new centres of industry. A case in point is afforded by Minnedosa, which lies to the north-west of Winnipeg, on the Little Saskatchewan River. It is now reached by the Manitoba and North-Western Railway, and I am informed by the Hon. Wm. Nelson Hood, who is well acquainted with the locality, that the land around Minnedosa is of the most fertile character, and that when its splendid water-power becomes fully utilised, this rising young city is not unlikely to grow up a second Minneapolis.

THE NORTH-WEST.

When the traveller leaves Winnipeg for the west by the Canadian Pacific Railway he notices that the line strikes out across the open prairie, and for a distance of five-and-twenty miles beyond the race-course there are no indications of cultivation; this is due to the land being held by speculators who are waiting for the "rise" which shall enable them to "clear out." "The country has only one pest worse than mosquitos, the speculators, called in vivid Western parlance 'boomsters,' who fortunately have, for the moment, burst themselves in a vain attempt to drink up the whole North-West!"* The traveller journeys on through the flourishing young towns of Portage la Prairie and Brandon; and after a run of some two hundred miles he, on the second prairie plateau, leaves the province of Manitoba, and enters the great North-West. Recent as has been the settlement of the majority of the inhabitants of Manitoba, that of most of the dwellers in the North-West is still more so. Indeed, it was not till the beginning of 1882 that the track of the Canadian Pacific Railway emerged from Manitoba into the vast territory beyond, and it was in the same year that this portion of the North-West was, for purposes of government, separated into four provisional districts, namely—

Assiniboia	..	..	..	95,000	square miles
Alberta	..	..	..	100,000	" "
Saskatchewan	..	..	..	114,000	" "
Athabasca	..	..	..	122,000	" "

Of these, Athabasca is greater, and each of the others less than the entire area of the British Isles. Regina is the capital and the seat of government of the North-West territories, and also the head-quarters of the North-Western Mounted Police, who are the guardians of the peace on the prairie; it is in Assini-

* 'Handbook for the Dominion of Canada,' p. 332.

boia, the other important towns being Moosomin, Broadview, Qu'Appelle, Moose Jaw, and Medicine Hat. Here it should be mentioned that Bishop Anson's Farm for the instruction of intending colonists in the agriculture of the Province is at Qu'Appelle. After leaving Manitoba, the railway traverses the length of Assiniboia for a distance of nearly 500 miles, and then enters the district of Alberta, which is bounded on the south by the United States, on the north by the district of Athabasca, on the west by the Rocky Mountains, and on the east by the districts of Assiniboia and Saskatchewan, the latter lying to the north of the former. Passing in a north-westerly direction out of Alberta, the Canadian Pacific Railway enters the Pacific Province of British Columbia, and almost immediately attains its summit level of 5300 feet above the sea in the beautiful Kicking Horse Pass of the Rocky Mountains, at a point 960 miles from Winnipeg. Had the line continued its westerly course, instead of trending to the north-west, it would have passed through the heart of the ranching country which extends southward from Calgary. The chief towns in the district of Alberta are Calgary, Fort McLeod, and Edmonton. In Saskatchewan the leading centres are Battleford and Prince Albert. It is not within the scope of this paper to enter into further details of this nature, but I have elsewhere given a fuller account of the young cities of the prairie.*

In seeking to obtain information as to the agricultural features of the great North-West, the inquirer experiences considerable difficulty, for, vast as this territory is, it possesses as yet no history, and such official records as do exist are meagre and insufficient. Originally the whole area was under the jurisdiction of the Hudson's Bay Company, and it is only within the last two years that there has been any influx of population from beyond its borders. But though Captain Butler, in his well-known book, correctly calls it "the great lone land," it is destined to remain lone no longer, for the irruption into its area of the well-laid track of the Canadian Pacific Railway has placed it within easy reach of settlers from the East, who will invade its solitudes, and cultivate the wilderness which was till so recently the home of the countless herds of buffalo which have now well-nigh disappeared. And yet it is twenty years since Viscount Milton and Dr. Cheadle advocated.—

"the opening out and colonisation of the magnificent regions of the Red River and Saskatchewan, where 65,000 square miles of a country of unsurpassed fertility, and abounding in mineral wealth, lies isolated from the world, neglected, almost unknown, although destined, at no distant period

* 'Across Canada: A Report on Canada and its Agricultural Resources,' obtainable at the office of the High Commissioner for Canada, 9, Victoria Chambers, London, S.W.

perhaps, to become one of the most valuable possessions of the British Crown."

The meteorological records of the North-West are necessarily very scanty, and the only figures I am able to quote are those indicating the temperature at Edmonton, in Alberta, on the North Saskatchewan River, during the months of 1882, the following table being abridged from the 'Twelfth Annual Report of the Meteorological Service of the Dominion of Canada,' which was published last year. I have also added in a parallel column the monthly mean temperatures in the same year at Humboldt, a station in Saskatchewan, considerably to the east of Edmonton :—

	Temperature at Edmonton, 1882. Degrees Fahrenheit.			At Humboldt, 1882. Degrees Fahrenheit.
	Mean Maximum.	Mean Minimum.	Mean.	Mean.
January	17·77	-4·28	6·74	-2·58
February	25·12	-3·66	10·73	6·96
March	24·54	1·08	12·81	7·90
April	..	..	..	28·93
May	62·45	37·06	49·75	46·84
June	69·37	47·04	58·20	56·47
July	72·00	49·51	60·75	60·61
August	73·35	48·33	60·84	63·16
September	62·26	35·70	48·98	49·23
October	42·15	27·41	34·78	34·47
November	30·49	10·23	20·36	16·97
December	19·08	-2·00	8·54	5·03

The highest temperature recorded during the year 1882 at Edmonton was on August 8, 9, and 10, on each of which days the thermometer rose to 87°. The lowest temperature (—52°) was touched on February 16. The thermometer did not fall to freezing-point between May 22 and September 16, and only on one occasion (June 21, 39°) did it sink below 40° between May 25 and September 5. Hence there is a short, but rapid season of vegetation during the summer months; and, speaking of Edmonton, Viscount Milton and Dr. Cheadle observe, "wheat grows luxuriantly, and potatoes and other roots flourish as wonderfully here as everywhere else on the Saskatchewan." In describing their journey along the banks of the North Saskatchewan towards Fort Pitt during the second week of April, 1863, they say—

"The weather was beautifully bright and fine, and the snow had almost gone. Flocks of ducks and geese passed continually, and the whistling of their wings, as they flew overhead on their way northwards, went on incessantly all night, almost preventing sleep. The country we passed through

was of the usual rich character—mingled woods, rolling prairies, and lakes and streams—except for one day's journey, when we crossed a bleak and barren tract. This was a level plain, backed by an amphitheatre of bare, rugged hills. But beyond this, at a place called the Source, from a river which springs out of the ground there, the country resumed its former character.”*

Nor are these intrepid travellers less enthusiastic in their description of the regions they penetrated after leaving Fort Pitt and moving westward towards Edmonton :—

“We now entered a most glorious country—not indeed grandly picturesque, but rich and beautiful : a country of rolling hills and fertile valleys, of lakes and streams, groves of birch and aspen, and miniature prairies ; a land of a kindly soil, and full of promise to the settler to come in future years, when an enlightened policy shall open out the wealth now uncared-for or unknown.”†

The system of survey adopted in the North-West Territories, and carried out by the Dominion Land Surveyors, is very complete, and so simple that a few letters and figures serve to indicate any given area without the least risk of ambiguity.

“The entire country is laid off in townships 6 miles square, containing 36 sections of 640 acres each, which are again subdivided into quarter sections of 160 acres. A road allowance, having a width of 1 chain, is provided for on each section-line running north and south, and on every alternate section-line running east and west. The following diagram shows a township with the sections numbered :—

	N						
	31	32	33	34	35	36	
	30	29	28	27	26	25	
	19	20	21	22	23	24	
W	18	17	16	15	14	13	E
	7	8	9	10	11	12	
	6	5	4	3	2	1	
	S						

* ‘The North-West Passage by Land,’ p. 172.

† *Ibid.* p. 178.

"The sections are appointed as follows:—

"OPEN FOR HOMESTEAD AND PRE-EMPTIONS.—Nos. 2, 4, 6, 10, 12, 14, 16, 18, 20, 22, 24, 28, 30, 32, 34, 36.

"CANADIAN PACIFIC RAILWAY SECTIONS.—Nos. 1, 3, 5, 7, 9, 13, 15, 17, 19, 21, 23, 25, 27, 31, 33, 35.

"Nos. 1, 9, 13, 21, 25, 33 along the main line, Winnipeg to Moose Jaw, sold to Canada North-West Land Company, the balance of their lands being in Southern Manitoba.

"SCHOOL SECTIONS.—Nos. 11, 29 (reserved by Government solely for school purposes).

"HUDSON'S BAY SECTION.—Nos. 8 and 26."

In the above diagram each little square represents an area of one square mile, and it must be apparent from the details just given that it is impossible for one purchaser to secure a very large uninterrupted tract of land.

To encourage and promote the construction of railways, the Dominion Government have granted certain concessions of land to the railway companies, so that both the latter and the Government are in a position to offer lands to intending settlers. The Manitoba and North-Western Railway Company, at present engaged in laying a line from Portage la Prairie, in Manitoba, to Prince Albert on the North Saskatchewan, have a land grant of 2,750,000 acres, out of which they had at the beginning of 1884 acquired a right to sell 512,000 acres. The Company sell land warrants, entitling the purchaser to one or more quarter sections of 160 acres each, to be selected by himself from any of the Company's unsold land.

The Government grant to the Canadian Pacific Railway comprises, in addition to other concessions, the lands lying within a belt twenty-four miles wide on each side of the line in Manitoba and the North-West. These lands are offered for sale, at prices ranging from 10s. per acre upwards, with conditions requiring cultivation, or at lesser figures without conditions. To encourage cultivation the Company stipulate that:—

"A rebate of from 5s. to 14s. sterling per acre, according to the price paid for the land, will be allowed on the acreage actually cropped, on the following conditions:

"1. The purchaser will not be entitled to rebate unless at time of purchase he enters into an undertaking to cultivate the land.

"2. One-half of the land contracted for to be brought under cultivation within four years from date of contract. In cases where purchasers do not reside continuously on the land, at least one-eighth of the whole quantity purchased shall be cultivated during each of the four years.

"3. Where a purchaser fails to carry out fully the conditions as to cultivation within the time named, he will be required to pay the full purchase price on all the land contracted for. But if from causes beyond his control, proved to the satisfaction of the Company, a settler so fails, he may be allowed the rebate on the land actually cultivated during the four years, on payment of the balance due, including the full purchase price of the remainder of the land contracted for.

"All sales are subject to the following general conditions :—

"1. All improvements placed upon land purchased to be maintained thereon until final payment has been made.

"2. All taxes and assessments lawfully imposed upon the land or improvements to be paid by the purchaser.

"3. The Company reserves from sale, under these regulations, all mineral and coal lands; and lands containing timber in quantities, stone, slate and marble quarries, lands with water-power thereon, and tracts for town sites and railway purposes.

"4. Mineral, coal and timber lands and quarries, and lands controlling water-power, will be disposed of on very moderate terms to persons giving satisfactory evidence of their intention and ability to utilise the same.

"5. The Company reserves the right to take without remuneration (except for the value of buildings and improvements on the required portion of land) a strip or strips of land 200 feet wide, to be used for right of way, or other railway purposes, wherever the line of the Canadian Pacific Railway, or any branch thereof, is or shall be located."

On its own lands the Government offers 160 acres (a quarter section, that is) free to each settler, with the privilege of pre-empting another 160 acres, the conditions being stated as follows :—

"Under the Dominion Lands Regulations, all surveyed even-numbered sections, excepting 8 and 26 in Manitoba and the North-West Territories, which have not been homesteaded, reserved to provide wood lots for settlers, or otherwise disposed of or reserved, are to be held exclusively for homesteads and pre-emptions.

"Homesteads may be obtained upon payment of an office fee of 2*l.*, subject to the following conditions as to residence and cultivation.

"In the 'Mile Belt Reserve,' that is, the even-numbered sections lying within one mile of the main line or branches of the Canadian Pacific Railway, and which are not set apart for town sites or reserves made in connection with town sites, railway stations, mounted police posts, mining and other special purposes, the homesteader shall begin actual residence upon his homestead within six months from the date of entry, and shall reside upon and make the land his home for at least six months out of every twelve months for three years from the date of entry; and shall within the first year after the date of his homestead entry, break and prepare for crop 10 acres of his homestead quarter section; and shall within the second year crop the said 10 acres, and break and prepare for crop 15 acres additional—making 25 acres; and within the third year after the date of his homestead entry, he shall crop the said 25 acres, and break and prepare for crop 15 acres additional—so that within three years of the date of his homestead entry he shall have not less than 25 acres cropped, and 15 acres additional broken and prepared for crop.

"Land, other than that included in Mile Belt, Town Site Reserves, and Coal and Mineral Districts, may be homesteaded in either of the two following methods :—

"1. The homesteader shall begin actual residence on his homestead and cultivation of a reasonable portion thereof within six months from date of entry, unless entry shall have been made on or after the 1st day of September, in which case residence need not commence until the 1st day of June following, and continue to live upon and cultivate the land for at least six months out of every twelve months for three years from date of homestead entry.

"2. The homesteader shall begin actual residence, as above, within a radius

of two miles of his homestead, and continue to make his home within such radius for at least six months out of every twelve months for the three years next succeeding the date of homestead entry; and shall within the first year from date of entry break and prepare for crop 10 acres of his homestead quarter section; and shall within the second year crop the said 10 acres, and break and prepare for crop 15 acres additional—making 25 acres; and within the third year after the date of his homestead entry he shall crop the said 25 acres, and break and prepare for crop 15 acres additional, so that within three years of the date of his homestead entry he shall have not less than 25 acres cropped; and shall have erected on the land a habitable house in which he shall have lived during the three months next preceding his application for homestead patent.

"In the event of a homesteader desiring to secure his patent within a shorter period than the three years provided by law, he will be permitted to purchase his homestead on furnishing proof that he has resided on the land for at least twelve months subsequent to date of homestead entry, and, in case entry was made after the 25th day of May, 1883, has cultivated 30 acres thereof.

"In the case of a homesteader being entitled to receive his homestead patent for land occupied by him for the full period of three years, he will, on production of a certificate to that effect from the Commissioner of Dominion Lands, be permitted to make a second entry.

"Any homesteader may at the same time as he makes his homestead entry, but not at a later date, should there be available land adjoining the homestead, enter an additional quarter section of and as a pre-emption on payment of an office fee of 2*l*.

"The pre-emption right entitles the homesteader, who obtains entry for a pre-emption, to purchase the land so pre-empted on becoming entitled to his homestead patent; but should the homesteader fail to fulfil the homestead conditions he forfeits all claim to his pre-emption.

"The price of pre-emptions, not included in Town Site Reserves, is 10*s*. an acre. Where land is north of the northerly limit of the land grant, along the main line of the Canadian Pacific Railway, and is not within 24 miles of any branch of that railway, or 12 miles of any other railway, pre-emptions may be obtained for 8*s*. per acre.

For reasons already stated it is impossible at present to give any figures representing the acreage under cropping, or conveying accurate information as to the average yields, in the districts of the North-West. Towards the close of last year, however, the Canadian Pacific Railway authorities sent out a large batch of queries to settlers in Manitoba and the North-West, with the intention of publishing the replies received, and, through the kindness of Mr. Alexander Begg, Canadian Pacific Railway, 88, Cannon Street, London, E.C., I have been favoured with an advance copy of this publication, and propose to make use of some of the facts contained therein, which I have less hesitation in doing, inasmuch as I am quite satisfied as to the *bonâ fide* character of these replies, and I do not think they would have been any different had I sent out the questions myself.

Most of the settlers in the North-West are poor, and a great many are forced to commence their operations with oxen only, being at first unable to afford horses. The tillage work of the

prairie is of a simple character, and as the sulky plough is so constructed as to seat the driver, even the ordinary skill of the ploughman is not a necessity. The first field operation is that of "breaking"; the top soil is turned over to a depth of from two to three inches, and in a slice varying from a foot to sixteen inches broad,—May, June, and July being the best months for this work. "Back-setting" follows in August and September, and consists in ploughing between the slices and turning the original surface to the top again, or, in some cases, wedging it up. Then, in April or May, after the long frost of winter has crumbled the soil and produced a good tilth, the land is ready for seeding and harrowing. Sometimes sowing "on the sod" is resorted to in spring, as in the case of oats, for example; the seed is sown on the surface of the prairie, which is then subjected to breaking, a sod a couple of inches thick being turned over.

It will not be thought that the soil all over the North-West is the same in character as the rich loam of the Red River valley, which extends through Manitoba; what has already been said as to the geological features of the great prairie region will show that there may be considerable variation. Each correspondent was requested by the railway authorities to state the nature of the soil on his farm and the depth of black loam. At Moose Jaw, the soil is reported various, but all good, with 6 in. to 12 in. of loam; at Regina, a black clay loam of unknown depth; at Moosomin, black loam, from 8 in. to 22 in. deep, with sand or clay sub-soil. Further information of this character is given later on in the description of the C. P. R. Experimental Farms.

Fuel, abundant in some localities, is very scarce in others, but the opening up of coal and lignite deposits in the North-West, and the increasing facilities for railway transport, will gradually place the settlers more on an equality in this respect. Wood is chiefly used, though that has sometimes to be drawn long distances. Water is obtained mostly from wells, sometimes from creeks, and in rare cases has to be drawn some distance.

The yields per acre for wheat vary between 25 and 40 bushels, the most usual estimate being 30. Barley ranges from 25 to 50 bushels, 40 being the most common estimate. Oats yield from 35 to 75 bushels, the usual quantity being about 50. Inferior yields are attributed by the farmers themselves to bad tillage or absence of back-setting. Garden vegetables, and particularly potatoes, are favourably reported. For potato cultivation the method is to plough and backset, and to harrow in the following spring, after which the seed tubers are laid in furrows made by the plough, which is then sent between the furrows to cover them up. This is done in May.

Stock are scarce, "67 cattle and 3 horses," and "30 horses and 20 head of cattle," being the largest returns from individual farmers. At Moose Jaw cattle do excellently on the prairie hay. They are stabled in winter if the weather is very bad, but are out most days. At Wolseley cattle fatten well on prairie hay alone, which was there cut 66 inches long last summer. The general opinion is decidedly favourable to the maintenance of sheep, though there is at present a drawback in the want of a market for the wool. At Ossowa, sheep realise from 6d. to 7d. per lb. in carcass. At Griswold sheep do exceedingly well; they run the prairie in summer, and are under shed in winter.

Eighty-four farmers expressed themselves as satisfied with the country, the climate, and their prospects; but some say more railways are necessary. Some want the Hudson Bay Railway to be made, and ask for free-trade in lumber and machinery, the duty of 33 per cent. on farm implements from the States being objectionable. Notwithstanding this tariff, the American machinery seems to hold its place against that made in Canada; quite half the implements on the Bell Farm are of American manufacture.

Asked whether they had suffered any serious loss from storms during either summer or winter, 154 farmers replied briefly in the negative. Of the 60 remaining answers one-third were adverse: hail, heavy rains, or frost causing the mischief, though the injury from frost is sometimes acknowledged to be due to late sowing. The autumn frosts on the prairie appear to be somewhat peculiar:*—

"Frosts are common there in the nights of September, but the fact has been noted by many independent observers that frost which would injure grain in many other countries appears to be innocuous on the Red River and the Saskatchewan. Various reasons have been assigned—such as the dryness of the atmosphere, the heat-retaining character of the soil, and the sudden change of temperature that enables vigorous plants to bear an atmosphere at 20° better than at 35°, when the latent heat of the earth and the plants has been given off. But whatever be the true cause, the fact appears to be well attested. The chief lesson which experience has taught the farmer is to sow his wheat early in the spring, so that the ear shall be past the milky stage before the frost comes."

Notwithstanding the long and severe winter the reports as to the climate nearly all concur in representing it as not only tolerable, but bracing and healthy, and people who have gone to the prairie in indifferent health have found the change beneficial. An old Scotchwoman wrote home, "It is fine to see the bairns play in the snow without getting their feet wet."

The settlers appear, in the great majority of cases, to have

* 'Encyc. Brit.,' Ninth Ed., Art. "Canada."

commenced with less than 200*l.* capital, frequently with less than 100*l.*, and sometimes with none. On the other hand, cases are recorded in which the initial capital ranged to as high as 2000*l.* The eighty or ninety farmers who furnish information under this head report their financial position as improved, and in some cases very markedly so.

Hitherto the North-West has derived the greater proportion of its settlers from the eastern provinces of the Dominion, chiefly Ontario. The arrivals from Europe have been almost entirely from the British Isles, but the country has not been opened up long enough to allow of any marked influx of population from the other side of the Atlantic. That has yet to come.

As the railway systems are extended in the North-West the old-fashioned bullock freight-trains will disappear. These, consisting of some dozen waggons lashed together in pairs, with sixteen or eighteen bullocks attached to each, were the common means of transport between the scattered forts of the Hudson's Bay Company. The old unswerving Indian trails are much used as roads; but when dry and free from ruts, the beaten prairie makes a very good road, the chief obstacle being the numerous holes and burrows made by gophers, which often render travelling awkward for horses; the buckboard, however, is very light, and its four large wheels specially adapt it to prairie travelling.

During the long winter the soil becomes frozen to a depth of six or seven feet, and as the upper layers thaw first and allow seeding to be effected, the progressive thawing of the lower layers, as the summer heat increases, provides an ascending current of moisture, which, meeting with the heat from above, constitutes a kind of natural hot-bed, and this phenomenon no doubt partly accounts for the very rapid rate at which vegetation proceeds during the brief period of growth.

At the present time the three most prominent and instructive features in the agriculture of the North-West are probably the Bell Farm, the Experimental Farms of the Canadian Pacific Railway, and the Cattle Ranches of Alberta, and I proceed to give some account of these in the order named.

The Bell Farm.—There is perhaps no enterprise in the North-West better known in England, at least by name, than the Bell Farm, which is so called after its manager, Major W. R. Bell. It is situated at Indian Head, in Assiniboia, 312 miles west of Winnipeg, on the Canadian Pacific Railway, and is included in the operations of the Qu'Appelle Valley Farming Company, Limited, whose capital comprises 120,000*l.* in shares of 20*l.* each, of which 45 per cent. is paid up. The entire farm occupies an area of 54,000 acres, and it was organised in 1882, so

that the first harvest gathered upon it was in 1883, and the second, which I was fortunate to see in progress, was in 1884. In the President's Report, presented to the annual meeting held on January 9th, 1884, at Winnipeg, it is stated that operations were begun during the summer and fall of 1882, when ground was broken to the extent of about 2700 acres, and as it was impossible to further prepare the land by back-setting, it was decided to sow on the "breaking," or once-turned sod. The experiment, for such it was, inasmuch as it had hitherto been the custom to backset before sowing, proved successful, and served to demonstrate that a crop might be raised after merely breaking the sod. Wheat gave an average yield of nearly 20 bushels of choice hard grain per acre, some of which was sold at 3s. 8d. per bushel, delivered on the cars at the farm station, Indian Head. Oats gave a light yield, attributed to severe drought in the early summer. Between 3000 and 4000 bushels were sold at from 3s. to 3s. 2d., but the bulk of this grain, 20,000 bushels, was kept for seed and feed. Ploughing of fresh prairie land was commenced as soon as the frost was sufficiently out of the ground, and was continued with all available force until November 7th, 1883, when active operations were suspended owing to the approach of winter. The ploughs were set to work on the stubbles as soon as the harvest was got in, and by the close of the open season of 1883 there were in all 7000 acres ready for the "spring tooth" and "disc" harrows that precede seeding.

The annual report for 1883 further states that during the year building was carried on continuously. Near the main building, erected in 1882, there was built a granary of 30,000 bushels capacity, with "lean-to" additions for the storage of implements, two barrack cottages for the accommodation of the men at the main station, a blacksmith's shop, and a horse-infirmiry, with several necessary sheds, while twenty-two additional cottages with stables were erected on the surrounding sections. Metal roofing is chiefly employed. The cottages are substantially built, of a uniform size, 26 feet by 30 feet; each contains five rooms, and most of these residences are occupied by married tenants. Each cottage, with stable attached, cost about 160l. A stationary farm granary, of 4000 bushels capacity, and fourteen portable granaries, circular in form, and capable of holding 1000 bushels each, were added to the storage facilities; and the Canadian Pacific Railway authorities had given their assent to the erection of an elevator*

* This elevator is now completed, and has a capacity of 50,000 bushels. Great progress was made in 1884 in the building of elevators, the Canadian

at Indian Head Station, at a cost estimated at 3000*l*. Three miles of fencing were built, and six miles of the chief highways had been planted with trees. The "Beautiful" lake at the south of the farm had been let down the channel of one of the three coulees, by which the farm is drained, so that by an appropriate arrangement of dams, the supply of water is now inexhaustible: the railway company agreed to share the expense of this work. Spring water of excellent quality had been struck at the main house and other stations about the farm.

The financial figures embodied in the report for 1883 are presented in rather a complicated fashion, but as they cannot fail to interest English agriculturists, I reproduce them here with as little variation as possible, merely remarking that in rendering Canadian money into its English equivalent, I have, in this case, taken the dollar at its more exact equivalent of 4*s*. 1½*d*. sterling, most of the other values in the course of this paper being arrived at by assuming five dollars equal to one pound sterling. The gross expenditure for 1883 was 35,546*l*. 11*s*., and the total expenditure since the organisation of the company, 50,453*l*.

Gross Distribution for the year ending November 30, 1883.

	£	s.	d.
Farm Fund, Capital (see below, A.) ..	22,836	17	0
Town Site	1,409	11	4
Farm balance, 1882	1,275	15	0
Listing Stock	10	7	0
Bills Receivable	73	12	0
Stock	368	19	3
W. R. Bell, Manager	85	2	0
Head Office	196	16	0
Farm Fund, Current (see below, B.) ..	6,721	18	9
Expense Account	118	7	0
Interest Account	416	7	8
Directors' Fees	47	9	0
Bills Payable	544	14	0
Bye-law	8	14	8
H. J. Eberts, Treasurer and Secretary ..	2	8	6
Salaries	1,429	11	10
	£35,546	11	0

This total will not, by the way, be found equivalent to the

Pacific Railway having erected one at Fort William, Lake Superior, to hold 320,000 bushels, and another at Port Arthur, with a capacity of one million bushels. The Ogilvie Milling Company built four, namely, Manitou, 40,000 bushels; Morden, 55,000; Morris, 55,000; Moosomin, 45,000. Others, erected last year, were at Emerson, 27,000; Gretna, 26,000; Morris, 20,000; Manitou, 30,000; Carberry, 40,000; Griswold, 30,000; and at Virden, 20,000 bushels.

corresponding one in the published accounts, inasmuch as I find what appears to be an error of 10,000 dollars in the latter.

The outlay on the farm,—				£	s.	d.
A. From Capital Account	..	..	..	22,836	17	0
B. From Current Account	..	..	..	6,721	18	9
Contingent	..	..	..	7	17	6
				<u>£29,566</u>	<u>13</u>	<u>3</u>

is thus made up:—

A. From Capital Account—				£	s.	d.
Balance on Ploughing in 1882	..	..		214	10	0
Buildings	..	..	..	7,600	7	8
Implements	..	..	..	2,833	1	0
Horses	..	..	..	3,118	17	5
Payments, Real Estate Account	..	..		6,314	10	0
Harness	..	..	..	301	11	7
Wagons and Sleighs	..	..	..	355	4	10
Cows	..	..	..	312	0	0
Furniture	..	..	..	56	16	6
Wells	..	..	..	308	8	5
Coulées	..	..	..	133	6	4
Fencing	..	..	..	55	4	4
Hogs	..	..	..	13	0	0
Labour on Improvements	..	..	..	1,205	15	5
Survey Balance	..	..	..	14	3	6
				<u>£22,836</u>	<u>17</u>	<u>0</u>

B. From Current Account—				£	s.	d.
Office	..	..	..	14	13	0
Maintenance	..	..	..	1,018	16	10
Interest and Exchange	..	..	..	18	12	0
Travelling Expenses, Telegrams, &c.	..	..		401	6	0
Stable Feed	..	..	..	1,491	19	4
Seed Wheat	..	..	..	874	9	0
Seed Oats	..	..	..	742	10	8
Salaries—Superintendent	..	219	8 2			
Book-keeper	..	45	9 4			
				<u>264</u>	<u>17</u>	<u>6</u>
Insurance	..	..	..	56	15	0
Printing	..	..	..	14	5	6
Coulées	..	..	..	164	15	0
Less (borne by C.P.R.)	..	133	6 4			
				<u>31</u>	<u>8</u>	<u>8</u>
Seeds	..	..	..	10	12	6
Blacksmith	..	..	..	16	19	3
General Work	..	..	..	108	14	10
Labour, Current	..	..	..	1,612	14	2
Teaming	..	..	..	3	1	0
Wood	..	..	..	27	13	0
Ice	..	..	..	12	10	6
				<u>£6,721</u>	<u>18</u>	<u>9</u>

I have had to take a few liberties with the balance-sheet, not, however, affecting its correctness, but simply to present it in a form, shown on the opposite page, in which it will perhaps be more easily understood.

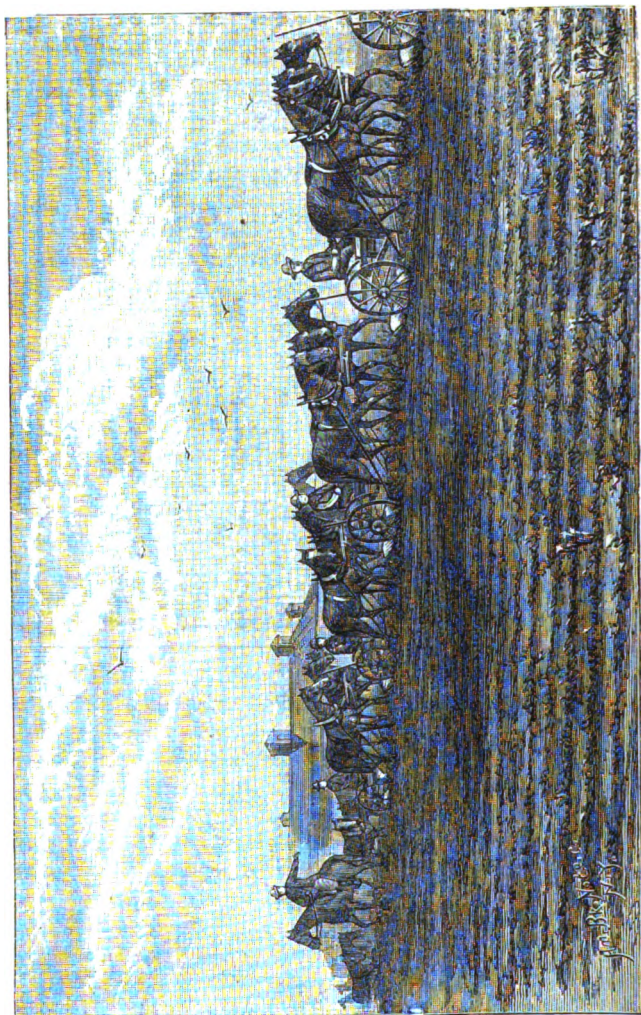
My visit to the Bell Farm was made on September 14th, 1884. Major Bell, who was exceedingly kind, gave Sir Richard Temple, Professor Sheldon, and myself seats in his waggonette, and obligingly answered the many questions we showered upon him during our tour of inspection. The following statements are derived from the notes I then took. In 1884, there were 7000 acres in wheat, and in 1885 it is proposed to have 14,000 acres under this crop. The harvest is usually over by the middle of August, but the summer of 1884 having been an abnormally cold backward season, the in-gathering of the crop was in full-swing at the time of our visit, so that we had an opportunity of seeing 35 self-binding reaping-machines at work side by side. The sheaves are left in stook for a day or two, and then carried to the threshing machines, the grain from which is shot into large wooden granaries in the fields. During winter, when work in general is slack, the granaries are emptied and the wheat is conveyed in sleighs across the snow to the elevators adjoining the railway, whence it is transferred to the freight waggons as required. The standing corn presented a good, regular, and clean appearance. The variety of wheat grown is that known as Red Fyfe, or No. 1 Hard; and it rubbed out into a dry, bright, even sample. No "docking" or weeding of any kind has yet been resorted to, and though, in the case of one field, the prairie rose seemed to have acquired undisputed possession at the beginning of June, the wheat eventually overpowered it, and ultimately gave a good yield. Of poppy there was no trace whatever, and I only saw one solitary plant of corn-cockle, and that, too, in a field of wheat measuring seven miles from corner to corner; most of the fields, however, are two miles long, by one mile wide. The straw was of fair length and beautifully clean, being free from even the faintest trace of rust; at present it is burnt as it comes from the threshing-machine, being used as fuel for the engine, and the ashes are returned to the soil. The steam machinery comprises seven threshing-machines with complete outfit. There are no less than 100 sulky or gang ploughs, and a large number of seeders.

The soil of the Bell Farm is a rich, deep, black loam, with a clay sub-soil. A three-horse team and a sulky plough, working on a 16-inch furrow, and set to a depth of three inches, can turn up two acres a day, at a cost of 8s. per acre. On an adjoining farm belonging to Colonel Sykes, and where steam-ploughing

Balance Sheet, Bell Farm, November 30, 1883.

LIABILITIES.				ASSETS.			
	£	s.	d.		£	s.	d.
Capital—promoters paid up	20,625	0	0	Due from Can. Pac. Rail. for moiety town site	704	15	8
" subscribed and paid	44,550	0	0	Ditto	67	5	6
Bills payable	3,229	13	0	Accounts due, head office	123	15	0
Unpaid accounts	1,398	6	2	Cash in hand	118	16	0
Can. Pac. Rail. account, real estate	2,494	16	0	Valuation:—			
Government	4,973	14	0	Moiety town site	6,187	15	0
Hudson's Bay Co.	1,732	10	0	Hotel	3,093	15	0
Accounts due at farm	453	15	0	Town lots	309	7	6
Credit of Profit and Loss	45,677	8	3	Bell Farm, 20,000 acres at 41s. 3d.	41,250	0	0
				33,720 acres at 24s. 9d.	41,728	10	0
				Breaking 7000 acres and preparing for crop, at 16s. 6d.	5,775	0	0
				Buildings and improvements	11,343	10	0
				Stock and implements, after deducting 20 per cent. for wear and tear	9,167	16	0
				Grain on hand	4,743	8	6
				Accounts due	521	13	3
					£125,135	2	5

Fig. 4.—Ploughing Bell Farm, Indian Head.



was resorted to, the cost was 2l. 6s. per acre. Ploughing necessarily ceases with the beginning of winter, but the pulverising effect of the long frosts in the promotion of a desirable tilth and the formation of a good seed-bed, is a factor of considerable importance in prairie farming. The wheat is sown at the rate of $1\frac{1}{2}$ bushels per acre by means of broad-cast sowing-machines, each drawn by one horse. The sowing takes place about the end of March on the rough fallow, the sowing-machines being followed by spring harrows, each drawn by two horses. The

Fig. 5.—The Bell Farm, Indian Head.



economy of the farm provides for a summer fallow once every three years, so that one-third of the acreage under cultivation would be left in bare fallow every summer, thus affording opportunity for keeping the land clean, while the aggregate yield of wheat will probably not be less than might be obtained by continuous cropping.

At the time of my visit about 200 horses were being maintained, and all that were not engaged in the harvest-work were employed in ploughing. The cost of a good carthorse, weighing 1400 lbs., ranges from 37*l.* to 40*l.* In summer 135 men are

employed, and in winter about half this number ; but of course as the acreage under crop is year by year enlarged, the number of labourers must correspondingly increase. The hours of work are from 7 A.M. to 6 P.M., with one hour out. The summer labourers' wages are at the rate of 30s. a week, and all found ; while the permanent labourers get a cottage and one acre of land free with 36s. a week in summer, and 30s. a week in winter. There are five foremen,—a first foreman, who gets 52s. a week, and all found, and four head foremen who get 40s. a week each, and all found. The farm is worked in five divisions, known as the central, and the north, the south, the east, and the west, respectively. At half-past eight o'clock each evening Major Bell telephones from his residence the orders for the ensuing day, and, as these are heard by all the foremen, the possibility of confusion or misconception is very slight.

With the 35 Deering's self-binding reapers already mentioned, it was found practicable to cut 800 acres of wheat per day, so that, at this rate, the entire 7000 acres could be cut in nine working days. The average yield of wheat in 1883 was 20 bushels per acre ; for 1884, it was estimated that the yield would reach an average of 25 bushels. The cost of growing wheat in 1883 was 1s. 6½d. per bushel ; in 1884, the cost was estimated to be not more than 1s. 5½d. per bushel, or 11s. 6d. per qr. Major Bell said he believed he could grow wheat and place it on the wharves at Liverpool at about 23s. per qr. This price included 8 per cent. interest on the capital involved, and anything above this figure, realised at the time of sale, would represent profit. This result is in accordance with the following statement, which is, of course, open to criticism :—

Estimated Cost of growing a Bushel (60 lb.) of Wheat on the Bell Farm.

	s.	d.
Horses	0	2½
Labour	0	3½
Maintenance of Labourers	0	1½
Sundries, including Seed, Implements, Depreciation, and 8 per cent. interest on Capital	0	9½
	1	5½

This is equivalent to 11s. 6d. per qr. of 480 lbs., and includes the cost of delivery upon the cars at Indian Head Railway Station, from whence to Liverpool is a distance of about 5000 miles. The freight-rate from Indian Head to Liverpool is at present 11s. per qr., thus bringing up the value of the wheat at Liverpool to 22s. 6d. per qr., this price including, as already stated, 8 per cent. interest on capital.

There were 500 acres of oats ready for cutting ; they would yield from 50 to 60 bushels per acre, and are largely used for feeding the horses. A 400-acre field of flax was nearly ripe ; it was being grown for its seed, which would sell for 3s. per bushel, and the land would go into wheat. Last summer 1400 tons of prairie-hay were gathered in ; the natural herbage of the prairie is cut by mowing-machines, allowed to remain exposed for about six hours, then horse-raked, laden on waggons, and stacked, the hay-stacks being conveniently "roofed" up but not thatched, the cost of the latter process being at present too great. About sixty cows and a few pigs are kept.

A good example is being set on the Bell Farm in the planting of trees ; some were planted in 1883, as has already been stated, and last spring 25 miles of young poplar trees were set out. They cost 5d. each, and were planted 20 feet apart, the cost per single row per mile being therefore 5l. 10s.

It is proposed when the whole area of the Bell Farm has been brought under cultivation to divide it into 300 farms, each with dwelling-house, stabling, and shedding. The farms, with their equipment, will be fairly valued, and then offered to the men who have taken part in the improvements, at the valuation price, with liberty to render payment in five or ten annual instalments.

Moreover, outside the 20,000 acres which constitute the Bell Farm proper, the Qu'Appelle Valley Farming Company offer their lands for sale in sections varying from 213 to 2560 acres in fee-simple, without conditions, at from 1l. 12s. to 3l. per acre, payable as may be agreed. The Company undertake to break and have ready for seeding the following spring, free of charge, 25 per cent. of the acreage purchased, and they offer various other privileges. The estimates are best reproduced as officially stated, the exchange in this case being at the rate of 5 dollars to the pound sterling.

"In order to give some idea of the cost, the following estimates have been carefully prepared, and may be taken as a guide. They are framed on the supposition that all labour is hired, and that the purchaser contributes comparatively nothing to the result beyond supervision. The question of stock is not gone into, though the addition of cattle, sheep, and pigs would most materially add to the profits, and indeed are a necessity to a thoroughly well-appointed farm.

"For a farm of 213 acres—one-third of a square mile section—the size best adapted for the team of three horses and one plough, on the supposition that the purchaser starts work in April with 25 per cent. ready for crop, and without importing into the consideration the original cost of the land, nor interest on capital:—

FIRST YEAR.

	£	s.	d.
Cost of cottage and stable erected the previous year	300	0	0
Sinking wells (2)	10	0	0
3 Horses and harness	120	0	0
1 Cow	14	0	0
1 Hand plough	5	0	0
1 Harrow	7	0	0
1 Waggon	18	0	0
1 Seeder (capacity 25 acres per day)	10	0	0
1 Self-binder (capacity of 200 acres)	50	0	0
1 Buckboard or single waggon	10	0	0
1 Sleigh	7	0	0
Garden implements, &c.	2	0	0
Miscellaneous tools	2	0	0
Contingencies	20	0	0
Furniture, not detailed, but say	60	0	0

Total on Capital account	£633	0	0
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	£	s.	d.
Paid labour, 1 man, 1 year	60	0	0
" 1 maidservant	24	0	0
60 Bushels seed wheat for 40 acres	15	0	0
25 Bushels oats for 10 acres	2	0	0
Garden seeds	1	0	0
Seed potatoes, 1 acre	2	8	0
Maintenance of Family (5) and servants	120	0	0
Repairs	6	0	0
One extra hand in harvest, 2 months	12	0	0
Threshing 1500 bushels at 2½d.	15	0	0
Oats and hay for feed before harvest	30	0	0
Twine for binding	3	0	0

Total on Current account	£290	8	0
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Total Expenditure	£923	8	0
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"In the mean time the ploughman will have broken during the season 100 acres new land and stubble, and ploughed 50 acres, so there are ready 150 acres for second year.

"The crop from first year will be:—

	£	s.	d.
1000 bushels wheat at (say) 3s. 4d. (about)	160	0	0
500 bushels oats	40	0	0
250 bushels potatoes and roots	20	0	0
	£220	0	0

SECOND YEAR—EXPENDITURE.

	£	s.	d.
Labour—man and girl	84	0	0
Extra labour, harvest and threshing	36	0	0
200 bushels wheat for seed	32	0	0
Seed, oats and feed	36	0	0
Hay	15	0	0
Maintenance	100	0	0
One sulky plough	15	0	0
Repairs and contingencies	30	0	0
Twine	7	0	0
Threshing	40	0	0
	£395	0	0

SECOND YEAR—RETURNS.

	£	s.	d.
140 acres wheat, 3500 bushels	560	0	0
10 acres oats, 500 bushels	40	0	0
Roots	20	0	0
	£620	0	0

"In the third year, and each year thereafter, the system of summer fallow is adopted, and the land cropped is 140 acres, leaving a different one-third thereof at rest each year. The crop will consist of 110 acres of wheat and 20 of grain and roots for feed; and the expenditure is about the same as that of the second year, saving that the cost of hay is dropped out, it being needless to carry it forward year by year.

"This will give expenditure	£365
And crop returns—wheat, other grain, and roots, as	568

Or a net profit of £203

"The estimates for a 500-acre farm may be approximately arrived at by multiplying the capital account of the 213-acre farm by 2, the current account by 2½, and the income by 3, producing the following results:—

"Capital account	£1266	£	s.
Current account		987	10
Income		1504	0

Net profit £516 10

Or a net profit of 23 per cent. on the whole expenditure.

"For a farm of 1000 acres, by adding one-third to the capital account of a 500-acre farm, one-half to the current account, and two-thirds to income, as follows:

"Capital account	£1688	£	s.
Current account		1481	5
Income		2506	8
		£1025	3

Or a net profit of 32 per cent.

"Cost of stock: working oxen, 35*l.* per yoke; milch cows, 12*l.* to 14*l.* for good grade; young pigs, 16*s.* to 2*l.* each; sheep, 1*l.* 4*s.* to 2*l.* each."

In criticising the foregoing statement, it is impossible to ignore the price of wheat, which is estimated to be worth close upon 27*s.* per quarter, free on rail, at Indian Head. This estimate seems to me too high, and certainly unreliable for a term of years. Adding 11*s.* per quarter for freight to Liverpool, the price at that port would require to be 38*s.* ex ship, a figure quite unobtainable during the past winter. Still, if a price at all approaching 27*s.* per quarter can be obtained at Indian Head, and wheat can at the same time be raised for less than 12*s.* per quarter, there is ample margin for profit.

The Bell Farm affords an example of farming reduced as nearly as possible to the factory system. The division of labour is necessarily carried to an extreme, and the management of so huge an undertaking involves an almost military discipline among the workers, and the proprietors are fortunate in having so experienced and capable a manager as Major Bell. It is an interesting phase of prairie farming, but it is farming with much of the poetry taken out of it.

The Alkali Lands.—Before describing the Experimental Farms of the Canadian Pacific Railway it seems desirable to place before the reader some account of the alkali lands of the North American plateaux, and though I have not been able to find a record of a thorough examination of any of those within the Canadian territory, yet as they are presumably much the same in character wherever they occur on the prairies, the following description of the alkali lands met with in the superficial deposits of Nebraska, written by Dr. S. Aughey, will convey a very fair idea respecting them:—

“Where they have been closely examined they are found to vary a great deal in chemical constituents. Generally, however, the alkali is largely composed of soda compounds, with an occasional excess of lime and magnesia, or potash. The following analyses of these soils show how variable they are. The first is taken from the Platte bottom, south of North Platte; the second from near Old Fort Kearney, and the third two miles west of Lincoln:—

Insoluble (silicious) matter	74·00	73·10	73·90
Peroxide of iron	3·80	3·73	3·69
Alumina	2·08	2·29	2·10
Carbonate of lime	6·01	4·29	3·90
Phosphate of lime	1·70	1·40	1·49
Carbonate of magnesia	1·89	1·29	1·47
Potash	1·68	1·80	3·69
Carbonate and bi-carbonate of soda	5·17	7·33	4·91
Sulphate of soda	0·70	0·89	0·89
Moisture	0·99	0·98	0·98
Organic matter	1·20	2·10	2·10
Loss in analysis	0·78	0·80	0·88
	100·00	100·00	100·00

"The specimens for analysis were not taken from soils crusted over with alkaline matter, but from spots where the ground was covered with a sparse vegetation.

"Many of the alkali lands seem to have originated from an accumulation of water in low places, where there is an excess of alumina in the soil or sub-soil. The escape of the water by evaporation left the saline matter behind, and, in the case of salt (sodium chloride), which all waters are known to contain in at least minute quantities, the chlorine, by chemical reactions, separated from the sodium, which latter, uniting immediately with oxygen and carbonic acid, formed the soda compounds.

"These alkali spots are often successfully cultivated. The first steps towards their renovation must be drainage and deep cultivation. The next step is the consumption of the excess of alkali, which can be effected by crops of the cereal grains in wet seasons. In such seasons these alkali lands, if deeply cultivated, often produce splendid crops of grain. Wheat is especially a great consumer of the alkalies; and these being partly removed in this way, and the remaining excess mingled with the deeply-cultivated soil, renders it, in many instances, in a few years capable of being used for the other ordinary crops of Nebraska. Treated in this way, these alkali lands often become the most valuable portions of the farm. There are comparatively few alkali lands in the State that cannot be reclaimed in this way."

Though in the foregoing analyses the percentages of phosphate of lime and of potash are high, the most remarkable feature is the extraordinary amount of carbonate of soda they show these lands to possess, which is more than sufficient to fully account for their alkaline character.

Canadian Pacific Railway Experimental Farms.—In consequence of rumours and reports to the effect that much of the country along the line of the Canadian Pacific Railway in its course across the third prairie steppe, which extends from Moose Jaw to Calgary, a distance of more than 400 miles, was largely made up of desert and alkali lands, and was consequently quite unfit for cultivation, the railway authorities determined to resort to the plucky expedient of establishing a number of experimental farms at various points on their line west of Moose Jaw, where they would be easy of access and examination by all travellers along the railway. Accordingly, on October 12th, 1883, a special train, consisting of fourteen cars and a locomotive, left Winnipeg for the west, carrying teams, men, and the equipment necessary for the establishment of the farms. So late in the season there was but little time in which to perform the necessary operations. As soon as the locality of a farm had been selected, the thirty teams were unloaded in the morning, and put to work under the direction of one of the Company's field inspectors, and continued to break the prairie-sod throughout the day. The Company's Land Commissioner, after seeing

* 'United States Geological and Geographical Survey of Colorado and Adjacent Territory,' 1874. By F. V. Hayden, U.S. Geologist. Washington: Government Printing Office, 1876, p. 280.

the day's work fairly started, took the locomotive and his car, and went on in advance until he found a suitable place for the site of the next farm, when he would return and get the men, teams, and outfit together, and transport them during the night to the next field of operations. In all, ten experimental stations were established; the breaking throughout was found to be easy, and the soil in every case good. It was proposed to cultivate the ground thoroughly, in accordance with the most approved methods of breaking and backsetting, so as to have a seed-bed ready by the spring of 1885; those in charge of the work were, however, led to believe that a good crop might be obtained, even off the sod, and it was resolved to make the attempt. Accordingly, on March 27th, 1884, another novel train left Winnipeg, taking boarding cars, men, teams, implements, and seed-grain to commence the spring sowings. At Winnipeg there was still much snow on the ground; but on going westward the weather became milder and the snow disappeared, so that when Dunmore was reached, on the 29th, the snow was entirely gone, while the ground was dry and already thawed to a depth of several inches. The train arrived at Gleichen, the most westerly of the farms, on the 30th, and ploughing and seeding commenced on March 31st. Bearing in mind that the sod was not broken till October, and that the soil had since then been continuously frozen, it is evident that the sod had no opportunity to rot, and the land, when spring seeding began, was practically in the same condition as when left in the fall, so that a proper seed-bed could not be prepared, consequently much of the seed remained on the surface to be withered by the sun or eaten by birds and gophers. To save space, I have condensed the particulars relating to the several farms into the Table on the opposite page, the yields given in which were ascertained by accurately chaining the ground and weighing the produce, this work having been entrusted to a qualified Dominion Land Surveyor.

I have given the yields in the nearest whole number, and the average yield from all the farms was, in bushels per acre: of wheat, $21\frac{1}{2}$; of oats, $44\frac{1}{4}$; of barley, $23\frac{1}{4}$; and of peas, $12\frac{1}{2}$. The weights per bushel varied at the different farms, in the case of wheat from 59 to 63 lbs.; oats, $36\frac{1}{4}$ to $43\frac{1}{4}$ lbs.; barley, 48 to 52 lbs.; and peas, in the only instance in which they were weighed, scaled 64 lbs.

With two exceptions, the harvest was completed before the end of August, while in no case was sowing commenced before the end of March. The short time the crops occupied the ground is worthy of note, particularly in the case of Dunmore, where sowing took place on the 4th and 5th of April, and

CANADIAN PACIFIC RAILWAY EXPERIMENTAL FARMS.

	Miles West of Winnipeg.	Feet above Sea Level.	Acres.	Soil (and its Depth in Inches).	Subsoil.	Yield in Bushels per Acre.		
						Wheat.	Oats.	Barley. Peas.
1. Secretan	443	2284	11½	Clay loam (5 to 10)	Sandy clay	22	44	17 10
2. Rush Lake	489	2310	13	Sandy loam (5 to 8)	Sandy clay	22	51	18 11
3. Swift Current ..	510	2130	20	Clay loam to sandy loam (10 to 15)	Clay and sandy clay	13	30	{None sown.} 10
4. Gull Lake	546	2369	30	Sandy loam (8 to 18)	Sand and sandy clay	21	56	30 16
5. Maple Creek ..	597	2500	18	Sandy loam (6 to 12)	Sandy clay	23	49	31 15
6. Forres	615	2437	28	Light sandy loam (5 to 12) ..	Sand and sandy clay	31	50	28 16
7. Dunmore	651	2406	35	Sandy loam (4 to 8)	Sandy	20	39	32 10
8. Stair	688	2439	18	Clay loam (6 to 10)	Clay	19	25	15 12
9. Tilley	713	2470	..	Sandy loam (6 to 8)	Clay	12	39	14 10
10. Gleichen	785	2961	42	Rich dark loam (8 to 14) ..	Clay and sandy clay	28	56	{None sown.} 13

C 2

barley was harvested on July 23rd; oats on August 6th; and wheat on August 7th. Barley thus occupied three months eighteen days for its growth; oats, four months one day; and wheat, four months two days. In some cases good vegetables were grown; and at Gleichen, in particular, I had an opportunity of inspecting some really excellent garden produce. The farm at Secretan, which gave an average yield in wheat and oats, is interesting, because it is situated at the summit of the Grand Coteau of the Missouri, a description of which is given in an earlier part of this paper.

At each farm an acre of land was set apart to determine the results of autumn sowing, spring-wheat and oats being sown and harrowed in at the time of breaking the sod in October. Much of it germinated in November and December and showed green above ground, but it was subsequently killed by frost during the winter. A few patches of wheat which managed to survive the winter, ripened very irregularly and much later than the spring-sown grain. Fall-sowing of spring-wheat, which has proved successful in Manitoba, is therefore not likely to be a success in the western country, where the winter is more mild and open and the grain liable to germinate and perish. Fall-wheat has not yet been tried on the western prairies.

The results obtained from these experimental farms cannot be regarded as other than satisfactory, especially when the rough methods of cultivation, which perforce had to be adopted, are taken into consideration. The matter was, of course, of very considerable importance to the Canadian Pacific Railway authorities, who base the following conclusions on the results arrived at:—1. That, for grain-growing, the land of the third prairie-steppe is capable of giving as large a yield as the heavier lands of Manitoba. 2. That a fair yield can be obtained the first year of settlement on breaking. 3. That from fall seeding with spring grain on the western plains a satisfactory result cannot be looked for. 4. That cereals, roots, and garden produce can be successfully raised at elevations of from 2000 feet to 3000 feet above the sea-level. 5. That seeding can be done sufficiently early to allow of all the crop being harvested before September 1st. With regard to this last point it might be thought that the summer of 1884 was abnormally early on the prairie, but I know that the contrary was the case; it had been an unusually wet backward summer—just the reverse of what we experienced in England—and, at the Bell Farm, 130 miles east of Secretan, the most easterly of the experimental farms, harvesting was, as I have already stated, in full operation on the 14th of September, a much later date than usual.

I may add that samples of wheat from the experimental

farms were submitted for the official inspection of the examiners of the Winnipeg Board of Trade, with the result that the wheat from four of the farms came within the No. 1 Hard Grade, which necessitates its being of the Red Fyfe variety, containing not more than 10 per cent. admixture of softer varieties, and being sound, well cleaned, and weighing not less than 60 lbs. to the measured imperial bushel. The wheat from Dunmore was of special merit, and was graded "extra."

Cattle Ranches of Alberta.—Though cattle are to be found in some numbers in the rich pastures around Turtle Mountain, Moose Mountain, the Wood Mountains, the Cypress Hills, and in the valley of the South Saskatchewan, it is in the Bow River district, south of Calgary, that the best grazing lands occur. The rolling lands, the coulées, the foot hills of the Rockies flanking the lofty summits that loom grandly against the western sky, afford plenty of ground shelter to cattle in this well-watered region; and the warm Chinook winds from the Pacific coast on the south-west rush through the Kootenay, Crow's Nest, Bow River, and numerous other passes. Luscious herbage, abundant and nutritious, grows in this favoured region, and it is here, in the south of the district of Alberta, that the Canadian ranches are to be seen. Stock-raising on an extensive scale is, however, a much younger industry in Alberta than in many of the Western States of the Union. Up to the spring of 1881, the number of cattle in the Bow River district did not exceed 3000: a year afterwards the number had, by importation of fresh cattle and the establishment of new ranches, risen to 15,000; and the increase has since been, and still is, progressive. The Dominion Government grants leases of sections of these grazing lands at the nominal rent of 1 cent ($\frac{1}{100}$ d.) per acre, and the lessee binds himself, within three years, to place upon the land one head of live cattle for every ten acres of land embraced in the agreement, the term "cattle" implying bulls, oxen, cows, or horses at least one year old. The contract is for twenty-one years, during which period the lessee agrees not to apply any part of the land to other than grazing purposes, nor to graze sheep upon the land without the consent in writing of the Minister of the Interior. Should the Governor in Council at any time during the twenty-one years think it to be in the public interest to open for settlement the lands devoted to ranching, or to terminate the agreement for any reason, the Minister of the Interior may, on giving the lessee two years' notice, cancel the agreement at any time. The leases are limited to the area of 100,000 acres, the full extent of which, however, is generally taken up.

As a general rule, in the western districts, a mild winter and

deep snow are unfavourable, while a severe winter and light snow are favourable, to live-stock ; but it is not often that a mild winter with deep snow is experienced near the Rocky Mountains. The Chinook winds are so frequent and the snows so light, that wheels are in use all the year round, sleighs being very little in request. Cattle and horses can graze all through the year, almost anywhere south of lat. 52° , and west of long. 110° , so that this would indicate the northern limit of the ranching districts to be about in the latitude of Calgary, although ranching is not so certain here as it is farther south towards McLeod. Indeed, it is maintained that though in the winter cattle and horses may die through unsuitable food, they will not perish from cold. The snow in the West does not lie to a greater depth than a foot or eighteen inches, and is often less, while near the Rocky Mountains the Chinook winds may, as has been noted above, more than once in a winter, lick up the snow and lay bare the pastures. A good cattle ranch should cover an area of at least from 20,000 acres to 30,000 acres. I am indebted to Mr. J. G. Colmer, Secretary of the Canadian Office, in London, for the following summary (p. 295) of the leading ranches and their equipment, as existing last summer in the district between Calgary and Fort McLeod on the east, and the Rocky Mountains on the west. The numbers would have been largely increased at the fall "round-up," but the actual figures are not obtainable yet.

Ordinarily all that is to be seen at a ranch is the open prairie, with the cattle grazing here and there, and the best time to see the cattle is at the "round-up," which, however, only takes place twice a year—in the spring and in the fall. Although each ranch company leases a certain definite area of land, its limits are not adhered to, because this would involve too great an outlay for fencing. Therefore all the cattle are branded with the marks of their respective owners, and they roam at will over the country. At the half-yearly "round-up" the cattle are all collected, and the various brands separated and counted, the calves being considered as the property of the ranch whose cows they follow. After the "round-up," any cattle not branded are sold, and the proceeds go to the Stockholders' Association to provide the funds with which their work is carried on.

The Cochrane Ranch is one of the best known. It occupies some splendid grass-land, and the cattle at three years old will weigh 1200 to 1300 lbs., and be worth 13*l.* on the ranch. Messrs. Cochrane, however, had an unpleasant experience three years ago. They purchased upwards of 4000 head of cattle from a ranch in Montana, to be delivered on the Cochrane Ranch

Ranches.	Cattle.	Horses.
North-West Cattle Co. (Sir Hugh Allan, High River)	4,500	420
Emerson and Lynch	1,200	200
Leavens, Mount Head Ranch (Lord Castletown), High River	1,500	600
Oxley Ranch (Willow Creek)	7,000	500
Captain Winder and Co.	1,700	250
Walrond Ranch Co. (North Fork, Old Man's River, Pincher Creek)	8,000	175
Jones and Inderwick (North Fork, Old Man's River, Pincher Creek)	1,450	80
Lee (Crow's Nest Pass, P. C. District)	300	30
Garnet Brothers (South Fork, P. C. District)	250	150
Smith (Pincher Creek)	400	40
Alberta Ranch (Sir F. de Winton; Hon. H. Boyle, Pincher Creek)	900	100
Halifax Ranch (Pincher Creek)	1,200	450
Geddes and Kettle (Pincher Creek)	500	20
Captain Scobie (Pincher Creek)	220	20
Hill Brothers (Pincher Creek)	180	40
Stewart Ranch Co. (Pincher Creek)	2,400	400
Godsall (Pincher Creek)	600	—
Cochrane Ranch Co. (Pincher Creek)	6,000	—
Hill and Paterson (Belly River)	800	50
McFarlane (Old Man's River, Fort McLeod)	600	50
J. G. Baker and Co. (Contractors' Beef Herd)	2,300	300
Gallagher (Fort McLeod)	160	—
Trefoil Ranch Co. (Old Man's River, near Fort McLeod)	300	75
Bryant (Willow Creek)	200	—
Military Colonisation Co., General Strange (Bow River)	300	300
F. Stimson (High River)	1,700	100
Vicinity of Calgary and Morley	1,000	1,200
Total	45,160	5,550

on a specified day in October. But they omitted to settle the time at which the cattle were to commence their journey, and as they happened to start late, they were so over-driven in order to get to their journey's end at the appointed time, that they arrived in a very exhausted condition. Cattle can travel at the rate of ten to fifteen miles a day across the prairie, and thrive on the journey; but much more than this was attempted in the case in point. There was a heavy fall of snow soon after their arrival, and the manager relied on the Chinook wind to remove it and leave the ground dry; but the Chinook wind was contrary, the snow remained, and in a few weeks several thousand cattle perished, the new arrivals being the first to succumb. It is possible that had these weak, enfeebled cattle not been mingled with the others, there would have been little or no mortality amongst the latter. At the time of this disaster, however, the site of Messrs. Cochrane's ranch was in the neighbourhood of Calgary, and cattle on other ranches in Alberta did not suffer

to anything approaching the same extent. It is but fair to add that the winter was a particularly severe one, and that a much larger percentage of cattle was lost in the Western States than north of the 49th parallel. The Cochrane ranch has since been removed farther south towards the Kootenay Pass, and last winter it was very successful, the mortality not exceeding 1 per cent., against 6 per cent. in Montana, and more still in Colorado. Many of the ranch cattle are of the old Spanish breed, but on the Cochrane ranch thoroughbred bulls—Short-horns, Herefords, and particularly Polled Angus—are being used. These bulls were imported from the Cochrane herds in Lower Canada; a journey of 3000 miles by rail and boat landed them at Fort Benton, on the Missouri, whence they were driven 400 miles to the ranch. On arrival, the Shorthorns were in extremely low condition, the Herefords were not much better, but the Polled Angus were in excellent order, and showed no signs of giving way during the severe winters of 1882 and 1883. One bull is allowed to each hundred cows, and always runs with the herd, though on some ranches the practice is to keep the bulls separate from April to August. Thoroughbred bulls are also in use on the Walrond, Oxley, and other ranches. The demand for beef in the North-West is in excess of the supply. The Government are large buyers for the North-Western Mounted Police, and for the Indians, every one of the latter being allowed 1 lb. of flour and 1 lb. of beef per day; these rations, with a certain area of land in the Indian reserves for each Indian family, being in accordance with the stipulations made with the aborigines when the pale-faced settlers deprived them of their land, and brought about the now almost complete extinction of the buffalo. The settlers, too, are considerable buyers, and there is a prospective market at Chicago, for the Montana ranchmen do a considerable trade with this city, their cattle being driven northwards across the international boundary to Maple Creek on the Canadian Pacific Railway, whence they are conveyed in bond to Chicago, *via* Winnipeg; this suggests an outlet for their produce which the ranchmen of Alberta are not likely to ignore. The price of steers last season was from 12*l.* to 14*l.*, and of dry cows from 10*l.* to 12*l.* The natural annual increase on the ranches is estimated at about 65 per cent., from animals two years old and upwards. Among the leading owners of Canadian ranches are the Messrs. Cochrane, Mr. Staveley Hill, Q.C., M.P. (who is interested in the Oxley ranch), General Strange, Sir F. de Winton, Lord Boyle, Lord Castletown, Earl of Lathom, and Sir John Walrond. The life of the "cow-boy," as the rancher is called, is necessarily rough and arduous, and often involves the spending of many hours in the saddle. The

special articles in a cow-boy's outfit are: a California saddle with tapaderos (fittings) complete, a rifle on saddle, a pair of schapps (leather leggings), a pair of Mexican spurs, an overcoat, and a cow-boy hat or soft sombrero. The following extract is from an article on Stock-raising in the North-West, which appeared in the Toronto 'Week' last October:—

"The method of working the cattle-ranches is similar to that in vogue in the Western States and territories. Although each owner has his own lease, by mutual consent 'free-ranging' practically prevails; and it by no means follows that the lessee has all or even the majority of his cattle on his own lease. The cattle, of course all *branded*, roam freely about the country. The large cattle companies employ constantly from six to ten 'cowboys,' with an experienced foreman, and a local manager, besides additional hands during hay-making, 'round-up' &c. A large band of horses is also necessary—say an average of five or six head to each cowboy, besides horses for team work and general purposes. Smaller owners—with herds under 1000 head—naturally manage with much greater economy. Two or three good practical men, with from twenty to thirty horses, can do all the work about the ranch and management of the cattle, with the occasional assistance of an extra hand or two.

"The stockmen of Alberta have formed a powerful association, known as the 'South Western Stock Association,' for the protection and advancement of their interests. This association has the management of the annual 'general round up,' which usually begins in May and lasts for about six weeks. All the stockmen in the country send representatives in proportion to the number of their herd, and each 'cowboy' brings with him from four to six horses. It can be imagined that, with 60 men in camp, and a band of over 300 horses, the scenes that occur are often lively and sometimes exciting. In the autumn, local 'round-ups' in the different stock districts are held for the purpose of branding the summer calves, which by the following spring would probably have left their mothers, becoming 'no man's cattle,' or as they are technically termed, *mavericks*.

"The life of the rancher and cowboy is at times a hard one—but withal, picturesque and somewhat romantic. It is true he almost lives in the saddle, but he rides over a splendid country, and enjoys (if he has the faculty) magnificent scenery. The numerous streams and rivers abound in trout, and prairie-chicken, grouse, ducks, and geese, afford abundance of game for the gun. His life has plenty of exciting variety and some danger. There are few more interesting sights than the cowboys at work on their well-trained, sagacious ponies, 'cutting out' cattle from an immense herd, frightened and bellowing, and only kept from a general stampede by the mere continually riding round them. Again, a herd crossing one of our large rapid rivers is a grand spectacle. One or two old steers, perhaps, wade in up to their knees, and then becoming suspicious, attempt to break back. But the main body of the herd presses on them, driven by a dozen cowboys, yelling and cracking their whips, in a cloud of dust behind and at their sides. The leaders are forced into deep water, and soon have to swim, striking out boldly for the farther shore; the others follow, while the cowboys ride into the current to 'keep them a'go'in'. Last of all come the calves, with the rest of the cowboys riding behind. But by this time the leaders are climbing out on the opposite bank, and the main body is drifting down stream in a confused mass. A couple of men gallop down the bank, plunge into the river, and head them up stream again, and in a few minutes the whole band, calves and all, are crossed in safety."

The provisions made by the Canadian authorities to preserve the live-stock of the Dominion free from disease, cannot fail to enlist the sympathetic attention of English farmers; and as the subject is, for various reasons, of special interest just at present, I proceed to give the substance of the regulations of an Order in Council which appeared in the official 'Canada Gazette' so recently as September 8, 1884. It refers to Manitoba and the North-West:—

Whereas the disease of pleuro-pneumonia prevails among neat cattle in the Western State of Illinois, as well as in other more eastern of the United States, and there is reason to believe that neat cattle for breeding purposes have been sent from the State of Illinois to more Western States and Territories, it is ordered that the importation of neat cattle now permitted from the United States and Territories into the Province of Manitoba and the North-West Territory of Canada be prohibited, except on the following conditions:—

1. At Emerson, in Manitoba, or the points of Fort Walsh and Fort McLeod, in the districts of Alberta and Assiniboia, or such other points as may be hereafter indicated by the Minister of Agriculture.

2. *For stock or breeding purposes*, neat cattle which have been brought to the Canadian frontier for importation may be allowed to cross, subject to regulations hereafter stated.

3. *For transit*, from West to East, through Alberta, Assiniboia, and Manitoba *via* Emerson or Gretna, to the State of Minnesota, neat cattle may be allowed to cross the Canadian frontier at Fort Walsh and Fort McLeod, subject to regulations hereafter stated.

4. At Emerson, such cattle from the East shall not be allowed to cross the Canadian frontier, unless after inspection by a duly-authorized veterinary surgeon, appointed by the Minister of Agriculture, they shall be declared free from contagious disease, and also from well-founded suspicion thereof; and further, such cattle shall be subject to a quarantine of 60 days, or such other period as may appear to the Minister of Agriculture advisable.

5. At Fort McLeod and Fort Walsh, cattle, whether for stock or breeding purposes, or for transit, shall not be allowed to cross the Canadian frontier unless they are declared by the duly authorized veterinary surgeon to be free from contagious disease, and also from well-founded suspicion thereof.

6. The owner must produce a duly attested certificate, stating the State or Territory and particular locality whence the cattle have been brought.

7. The importer of such cattle shall pay a fee: for one arrival, 4s.; for not exceeding five, 2s. each; not exceeding ten, 1s. 3d. each; not exceeding twenty, 10d. each; not exceeding fifty, 6d. each; over fifty, 5d. each.

8. No car which has been loaded with cattle in the United States, and crosses the Canadian frontier, shall be allowed afterwards to carry Canadian cattle.

9. No car or cars carrying such United States cattle in transit from West to East, between the points above named, shall be allowed to be shunted in close proximity to any Canadian cattle.

10. Every such car shall be kept as far apart as possible from cars or trains carrying Canadian cattle or Canadian goods.

11. No such car shall form any part of a train carrying Canadian cattle.

12. Every car or train carrying cattle in transit from West to East between the points before named, shall stop at such fixed places as shall be named by the Minister of Agriculture for the purpose of rest, feeding and

watering; and such places shall be declared 'infected' within the terms of 'The Animal Contagious Diseases Act, 1879,' being strictly isolated, and all communication with them prohibited, except by the officers and men in charge of the trains, or of such infected places.

13. Every car which has been used for carrying animals from the United States or Territories, in transit through the Districts of Alberta and Assiniboia, or the Province of Manitoba, *viâ* Emerson and Gretna, shall be thoroughly cleaned and disinfected before re-entering the Province of Manitoba, in such manner as shall be ordered by the Minister of Agriculture.

The suitability of Southern Alberta to purposes of ranching is now regarded as established. It is stated that the poorest pastures in Alberta surpass the greater part of the area of the State of Montana in stock-raising capabilities, and some of the leading ranchers in Montana are directing their attention to Alberta. It is believed that in a few years Alberta, which is already arranging to supply the Winnipeg market with cattle, will furnish beef and mutton, not only to the eastern provinces of the Dominion, but to the English market as well. In the Calgary district, the cattle are being transferred farther south, and the old ranches are being stocked with sheep and with other cattle more particularly suited to the lands in that section; sheep being at present excluded from the district which lies south of a line drawn from the High River to the Bow River, and thence along the South Saskatchewan. Last summer over 12,000 sheep were driven from Montana into Alberta, one company alone importing a flock of 8000 head, and in the season of 1885 the drive of sheep is expected to far exceed that of last season. The upwards of 6000 horses in Alberta are estimated to be worth 80,000*l.*, and the leading ranches are doing their best to improve the breed, having imported from across the Atlantic a number of first-class sires, including Percherons and Clydesdales. The estimated value of the cattle of Alberta last summer was 375,000*l.* Bovine epidemics are entirely unknown in this region, and though it is customary for the cattle on these ranches to be neither sheltered nor in any other way cared for during the winter, yet the projected North Western Live Stock Company proposes to erect buildings for the housing of cattle during the winter, and to properly furnish, equip, and gradually enclose the lands. But the opinion of most of the ranchmen is that no danger need be apprehended from prolonged falls of snow, even if such should occur, provided there are abundant stocks of hay with which to feed the cattle; indeed, prairie hay is now largely gathered in summer for this purpose.

It is worth noticing that the amount of butter made in Alberta does not nearly supply the local demand, and last summer farmers found a ready sale for all they could make at from 1*s.* 5*d.* to

2s. per lb. This is partly attributed to the high price of dairy cattle; the number of these was, however, largely increased during the season. The manufacture of cheese has not yet commenced in Alberta, but several enterprising farmers intend to embark in this industry next summer. Indeed, with its rich, sweet, and luxuriant grasses, and its innumerable streams of pure cold water, I can see no reason why Alberta should not develop into a first class dairy farming country, nor why Calgary should not become one of the great cities of the Dominion. I must thank Mr. F. Cochrane for considerable information, which he was kind enough to give me when I was at Calgary.

Life on the Prairies of the North-West.—The prairie, whether flat or rolling, is less uninteresting than might be imagined. On the level prairie it is possible to get a conception of the immensity of the blue vault overhead, such as can be obtained nowhere else, not even on the sea, for the contrast between earth and sky is more marked on the prairie than on the ocean. But one duty seems imperative on the prairie farmer, at least it should be—and that is the planting of trees. They can be obtained cheaply enough, and a few put in every year would, even in half a dozen years, immensely improve the appearance of the now treeless plain. They would also act as conservators of moisture, and, besides breaking the force of the wind, would afford grateful shade in the summer and shelter in the winter to both man and beast. Although various species of clematis, buckthorn, maple, black-thorn, bramble, rose-briar, and white-thorn grow in one part or another of the prairie, and might no doubt be combined into hedge rows, yet these latter are undesirable, as they would afford facilities for the accumulation of snow-drifts. Hence, as a lover of the picturesque in agriculture, I advocate the practice of tree culture on the Canadian prairies; every tree that is planted will constitute a potential source of wealth, and ere long it might be said of the North-West prairies as it is of Nebraska: "The bleak naked surface of this prairie State has become diversified with myriad groves which relieve the monotony of the landscape and refresh the eye with the beauties of woodland growth, while they form a barrier against the winds, and are developing into valuable preserves of timber." Indeed, Professor Brown, of the Ontario Agricultural College, looks forward to the time when the North-West will be in a position to constitute, by annual wood-thinnings, a source of revenue, and, with this object in view, he advocates—

"1. The establishment of two or more stations as nurseries throughout the North-West, with houses for labourers and foremen, and enclosures suitable for production of trees, both from seed and by purchase.

- "2. The careful testing of varieties of trees native and foreign to Canada.
- "3. The gradual and systematic choice of positions for plantations, their fencing, and such cultivation preparatory to tree-planting, as may be necessary.
- "4. The immediate recording, by Statute of the Dominion, of power by Government to resume any part of land leased or sold, or to be leased and sold, for purposes of tree-planting.
- "5. The gifts of trees to settlers, upon conditions.
- "6. The annual planting and care of the trees upon the best known principles of science and practice.
- "7. The appointment of a Forest Conservator—directly responsible to Government."

The healthiness of the prairie as a place of abode hardly admits of a doubt. There is certainly the long period of five months of winter to struggle through, but the dwellers on the prairie are a cheerful people; they work through the summer and have time to spare for festivities in the winter. Besides, there is no problematic element about the winter on the prairie as there is in England. The settlers know perfectly well that at some date in November everything will get frozen up, and will remain so till March or April. They expect it, and they are prepared for it. Their clothing is suited to such a winter; their houses are admirably arranged for the utilisation of stove-heat, and the people are quite ready to use melted snow in their tea-kettles. The children, born and bred on the prairie, cannot fail to be hardy and healthy, and this vast territory seems destined to become the cradle of a fine race of men. I saw children it was a pleasure to look at, and one day when a halt was called for half an hour, I was wandering alone across the prairie, when a lovely child, the picture of health and beauty, approached me, and in the frankest, most winsome manner possible, gave me a bunch of the sweet-smelling holy grass, *Hierochloe borealis*. Of course, I thanked the donor—she was quite a little girl—for her graceful welcome to the stranger from the East, and gratefully accepted the gift. I have it now, and mean to keep it, but my recollection of the charming little "prairie flower" by whom it was given to me will remain long after the fragrance of the holy grass has passed away.

Though many of the prairie towns are barely a year old, there is far less roughness, and much more evidence not only of civilised, but of polite life, than might be looked for. This is, no doubt, greatly due to the fact that not a few gently nurtured women have bravely determined to face the hardships of a pioneer life in order that they may soften the struggle for brothers, or fathers, or husbands. And some of the ladies of the North-West are as witty as they are accomplished. Last autumn two or three English ladies somewhat given to severe forms of

study, called on the wife of a well-known prairie farmer, and happened to mention that one of their chief objects in visiting the North-West was to discover all they could about primeval man. "Yes," sweetly rejoined their hostess, "but don't you think it would be far more interesting if you turned your attention to modern man?"

The Marquis of Lorne gives a graphic description of the prairie: *

"For my part I never tire of the summer aspect of the plains. In the winter they are often desolate-looking enough; and what landscape is not? There is at all events this to be said for the winter prairie, namely, that the sky is seldom only of a dull grey above it, and is oftener than in Europe of a bright blue, filled with the cheerfulness of sunlight.

"There is one drawback in summer, and this is the universal presence of the mosquito; but take a day in autumn, and then see if you do not enjoy the prairie. If you are in the eastern parts, the long grass is nearly up to your hips as you stand in it, and its green blades are varied with purple vetches and tall asters. Your horizon is circumscribed, for poplar clumps, with their white stems trembling in the noonday mirage, are not far off, in whatever direction you look. Out of the netting of the poplar you emerge into a more open world, with hardly a tree. The grasses are not so long, but still the lily or the sunflower is present in masses of blossom. There are marshes thick with tall sedge, and long tawny grass around the margin. There are clear pools and lakelets fringed with reed; and in September what numbers of wild fowl!—swans, difficult to approach, and tall white cranes, and the small sand-crane in flocks. We hear cries in the air above us, and, looking up, we see against a grey cloud great white birds flapping heavily along. They are pelicans, white except the quill-feathers; and behind them now, but rapidly overtaking them, is a long string of other birds, also white, except the wing-feathers. These fly in waving curves, looking in the distance like rows of pearls waved in the air. They are snow-geese, coming, like the pelicans, from the far northern breeding-grounds, and they alight on a lake near at hand, making a long white band on its blue water. They are worth stalking, and an attempt is made, but only one is killed, and the rest take the wing and are no more seen that day. But the ducks are tamer, and come circling back, and afford excellent sport. What a variety! The most common are blue-wing teal, shoveller, dusky duck, and mallard. Certainly there is no easier and better way of having wild-fowl shooting than by a visit to the North-West. Once out of Manitoba the land swells into waves, and from each ridge a marvellous extent of country is seen. The lakes are fewer, and a long march is sometimes necessary before a good camping-ground is found. The herbage, except in such spots, is poorer, and the general effect given by it is a dull grey-green, shading in the middle distance to grey and ochre, and then far away these tints become mixed with delicate pinks and cobalt blue. 'Far away?' Yes, indeed, the distance seems infinite. You gaze, and the intense clearness of the air is such that you think you have never seen so distinctly or so far over such wide horizons before. Plateaux, hollows, ridges and plains lie beneath you, on and on, and there is nothing to keep the eye and mind from the sense of an indefinite vastness. There is no special mark to arrest the gaze, and it wanders and wanders on to those pink and blue shades, where the skies, light and beautiful in tint, are joined in harmony of colour to the endless swell and roll of the uninhabited world beneath them. A wonderful

* 'Canadian Pictures,' p. 178.

sense of freedom, and yet of loveliness, is borne in upon you; and you feel perhaps that you would like to keep the liberty and yield some of the loneliness, and pitch your tent and live, if live in the wilderness you must, away to the north, where the streams chime in swifter currents through the more varied lands, and forest succeeds meadow, and fertile dale and prairie have near them the whispering shelter of the firs, and morning and evening lights above these the flaming colours of rose and of crimson on the snow-fields of the Western Alps.

"We will hurry on to Edmonton, and hear the reports there. Many men from Ontario have got property here, and there is abundance of coal as well as of timber in the vicinity. Horses do well when left out in winter. This is now comparatively well-known ground, but there may be some interest in endeavouring to see what lies beyond the paths which are already more or less beaten tracks. There is no stranger sensation than that of camping night after night in meadows which are full of such good grass that you feel inclined to look round for their owner and to ask his leave. But there have been none from the beginning of time to say you 'nay.' Even the savage has here never molested the pioneer. No one having a taste for exploration, for sport, or for settlement in some far-away but fair region, where he may live as the pioneer of a community on land certain to rise in value, need fear to pursue his object on account of any native's hostility. There is no one to hinder him, if he wishes to break the soil where the great Peace River forces its way through the grand masses of the mountains, or settle near the Hudson's Bay Company's posts farther down along the banks of the deeply-wooded stream. There is a singular charm in thus being amongst the first in a new land, but by-and-by more companionship is desired: and it is not to be doubted that each wave of emigration as it is poured westward will send many a stout fellow onward until he rests satisfied with his farm, from which he may see the giant and serrated ridges and peaks of the Rocky Mountains far away, cut clear and distinct, dark blue, against the western sunset light."

As the traveller by the Canadian Pacific Railway speeds onward across the prairie, he will not fail to notice every now and again, the buffalo skulls which lie bleaching in the sun. Last autumn these were quite familiar objects, but the utilitarian spirit of the age will allow them to rest there no longer. They are being collected and sent in truck-loads eastward, to be worked up at St. Paul or Chicago into artificial fertilisers.

Intoxicating liquors are entirely prohibited from the whole of the North-West, and it is illegal either to make or to possess any of these fluids. This prohibitive law is not in force, however, in Manitoba, and as a train leaves this Province and enters Assiniboia, members of the North-Western Mounted Police may come "aboard" and search the cars for contraband liquor, as indeed they may do anywhere else between Manitoba and British Columbia. The law was made for the sake of the Red Indians, who do not understand the intelligent use of "fire-water," but who will speedily drink themselves into a state of frenzy, provided they get an opportunity to quaff *ad lib.* It is an offence under any circumstances to supply an Indian with alcoholic drink. The "free and happy barley," which flourishes

so well in the North-West, and the magnificent hops which grow wild, cannot there mingle their infusions as they do in many lands where Red Indians are not. However, the prohibitive law is not irrevocable, but it will probably remain in force just so long as the weakness of the Indians for alcoholic liquors may appear to render it expedient. The prohibition is said to have had a very beneficial effect during the time that the large body of workmen engaged in laying the Canadian Pacific Railway passed through the land. Enthusiastic dwellers on the prairie say that the very air is intoxicating, and though it did not produce this effect on me, I am quite prepared to admit that it is invigorating.

The Settlements.—A brief reference to a few of the settlements in Manitoba and the North-West may prove interesting to readers who have given attention to the subject of emigration. The Selkirk settlement, which has already been mentioned, began with a grant of land near Fort Garry, made by the Hudson's Bay Company to Lord Selkirk in 1811. The following year the first immigrants arrived from Scotland, and landing at York Factory on Hudson's Bay, proceeded southwards to the Red River. Four years later another body of settlers arrived, and one or two of these are still living, notably, Mr. R. McBeth, Kildonan, on whose land wheat has been grown continuously for fifty years, and the yield remains as good as ever. Many of the descendants of these old settlers are now among the wealthiest farmers of Manitoba and the North-West.

The crofters in the Gordon-Cathcart settlement, who went out in 1883, under the scheme of emigration elaborated by Lady Gordon-Cathcart, have, so far, made excellent progress, and were joined by other crofters last year, so that there are now located on the settlement, which extends over about 250 square miles, some 60 families. They have mostly settled on a very moderate expenditure, the means for which were advanced to them on easy terms; but although they appear to have succeeded admirably hitherto, and to be well pleased with their prospects, sufficient time has not elapsed to permit me to speak very definitely. They are located at Wapella, Assiniboia.

The same reservation applies to the East London settlement at Moosomin, in the extreme east of Assiniboia. This was a more hazardous experiment than in the case of the crofters, for most of the settlers from London were quite unacquainted not only with farm-life, but even with country-life, and a more marked contrast than that which exists between the prairie and the East-end of London can hardly be conceived. The settlement at present consists of about 20 families, and from the reports of

several philanthropic gentlemen who visited it last autumn, the progress hitherto made, as well as the outlook, are of an encouraging and gratifying character.

One of the most interesting settlements is that of the Mennonites. They were German-speaking Russian subjects, followers of Simon Menno, who preached that war is a crime, and rather than undergo military service, they—or at least such of them as could get permission from the Russian Government—left their homes and emigrated to Canada, where the Dominion Government, in 1876, made them a grant of 640 square miles of some of the best land in the Red River Valley, in Southern Manitoba. The soil is a good loam, 3 feet deep, and as the settlement has been established eight years, the Mennonite farmers may fairly be expected to have acquired some exact knowledge of the capabilities of the land which they till, and they find it desirable to allow a bare fallow every fourth or fifth year, this being about the only case of fallowing in Manitoba. They have some such "rotation" as,—wheat, wheat, oats, wheat, fallow; the season of fallow being known as the "black year." Wheat is most largely grown, then oats; barley is only sparingly cultivated. I believe they have not yet tried a cropped fallow, but this would seem desirable, particularly as they fallow the land because they find it has become too weedy and dirty after the fourth successive corn crop. The cultivation is prosecuted on a kind of communal system, there being a huge field of wheat belonging to a number of families, another of oats, and so on. Their cattle are herded in one huge pasture, and the manure from the cow-houses is cut into oblong pieces, dried in the sun, and stacked in the same way as "turf" in Ireland, and, like peat, it is used in winter for fuel. The Mennonites now number some 8000 people, and their settlement comprises a number of villages. Many of their kinsmen in Russia would no doubt like to join them, but the Russian Government has not allowed any of them to emigrate since 1876.

There are also a Jewish settlement, made up of Jews of various nationalities, and an Icelandic settlement.

FUTURE OF PRAIRIE FARMING.

Most of the farming in Manitoba and the North-West must be described as pioneer farming. There is very little settled or approved practice, and rotations are almost unknown. But Manitoba has taken a great step in advance in the establishment of her Board of Agriculture, probably the most efficient in the Dominion, and the influence of which is bound to make its mark upon the development of agriculture in the Province.

The dearness of hired labour, and the necessity, especially at harvest-time, of getting through much work in a short period, lead to a great demand for labour-saving appliances, many of which are of American make. Current prices last summer were about as follows:—Breaking plough, 4*l.* 7*s.*; stubble plough, 3*l.* 10*s.*; sulky plough, 13*l.* 10*s.*; sulky gang plough, 20*l.* 11*s.*; set of iron harrows, 3*l.* 10*s.*; broadcast seeder, 12 hoe, 14*l.* 16*s.*; horse hay-rake, 7*l.* 10*s.*; twine-binder, 5 feet cut, 48*l.*; ditto, 7 feet cut, 52*l.*; Brantford mower, 16*l.*; reaper, 21*l.*; waggon, 4 wheels, 15*l.* 10*s.*; set of Manitoba bobsleighs, 6*l.* 5*s.* A yoke of oxen would cost about 32*l.*; and a set of ox-harness, 2*l.* 10*s.*; a 12-horse-power threshing-machine, 240*l.* to 280*l.* A smooth wire-fence with wooden uprights, which offers no facilities for snow-drifts, costs, including fixing, from 20*l.* to 30*l.* per mile; two men can fix a mile in four days. At the leading stations along the Canadian Pacific Railway implements and machines are exposed for sale.

Undoubtedly one of the great dangers this new field of agricultural enterprise has to face is that which arises from careless and slovenly cultivation; and of this, even now, plenty of examples may be seen. It may arise either from ignorance on the part of the cultivator, which to some extent is pardonable, or from the conduct of a mere speculator, who, having taken up a section in a locality where he thinks land may, for various reasons, rise in value, gets all he can out of the soil, and then tries to dispose of his holding at a profit. It must, however, be admitted that the very ease with which the prairie soil is brought under cultivation constitutes in itself some sort of temptation. It is so unlike Eastern Canada in this respect,—there is no laborious and protracted labour with the axe to fell timber and make a “clearing,” nor is there a patient waiting for years in order that charred root-stumps may rot and get torn up, and the space they cover become occupied by crops. The pioneer in the Far West can commence his tillage operations at once, and can even take a crop of oats “off the sod” if he pleases. Considerations such as these cannot but afford some cause for anxiety to those who have thought upon the problem of the agricultural development of this vast region of the British possessions; and I may be permitted to reproduce here opinions which I have not hesitated to express elsewhere: *—

“It is much to be hoped that the prairie farmers will not abuse the privilege they have of working a virgin soil of great fertility by indulging in reckless or slovenly farming. No doubt the temptation is great to take out of the soil all that it will yield, and to care little or nothing about its future. But

* ‘The Canadian Gazette,’ January 22, 1885, p. 364.

it should not be forgotten that the fertility of a soil, which may be very greatly reduced by slovenly farming, may be undoubtedly conserved by prudent methods. The wise farmer is he who takes up only a certain amount of land, and farms it well, rather than he who undertakes the management of an area altogether beyond his capital and his proper supervision. Slovenly farming must tend sooner or later to deteriorate the value of the holdings. The prudent settler will no doubt think of the time when he will wish to hand over his property to his sons, or possibly to realise upon it, and thus it is that good and careful farming will be bound to tell. Even in the course of a few years a slovenly farmer with a large holding will find himself in a worse position than a careful farmer with a considerably smaller holding. Hence, the most prudent course to pursue is for the settler to commence with a small area and farm it well, and to gradually extend his holding as he finds he has more means at his disposal."

The great majority of prairie farmers have necessarily gone to the greatest outlay which their capital will warrant; and though the prairie is not without its wealthy farmers, a larger influx of men with fair means would be of great service, for they could show a superior style of farming, and by their example stimulate their brother farmers to achieve better results on their own holdings. As to the direction which prairie farming is likely to take:—

"There can be no doubt that the natural herbage of the prairie (and it must be remembered that on the typical prairie no plants attain higher stature than we ordinarily associate with the idea of herbage) affords at present unlimited capacity for the production of beef and mutton. Hitherto prairie farming seems to have been directed rather to the production of grain. The results that have been attained, it is true, undoubtedly justify the general impression as to the first-class wheat-producing power of the prairie. But, from what I saw, I am led to infer that very much of the prairie land is capable of yielding better results than those which may be derived by the growth of cereals alone. It would be a most desirable thing, every one will admit, for the prairie farmer to be able to render himself to a great extent independent of fluctuations in the price of wheat, and I believe that, if his operations were directed in the proper groove, he should be able to supply himself and his family with all the necessities of life except groceries. Mixed farming, and mixed farming alone, can effect this end. The question which presented itself to my mind, therefore, was whether the prairie soil and its surroundings were adapted to mixed farming, and I have not the least hesitation in answering in the affirmative. To make the prairie a mere wheat-producing area appears to me a mistake. I hold that every prairie farmer, though dependent perhaps in the main on the growth of cereals, should by no means neglect the maintenance of live stock."*

The splendid soil of the Red River Valley only occupies the eastern border of the prairie, and though soil of a similar rich character extends along the valleys of the Saskatchewan and the Peace Rivers, the time will come when manuring will be necessary over much of the area of the prairie. The main-

* *Ibid*, p. 363.

tenance of live-stock, too, will enable the straw of the cereal crops to be put to more economic use than that of fuel.

There is a prevalent idea that, because the farming on the prairie is, much of it, primitive in style, it is immaterial whether an intending settler knows little or much of the practices of modern agriculture. Such a notion is delusive and mischievous, and there can be no doubt that a knowledge, and a good knowledge, of English farming would prove extremely valuable on the prairie. Equipped with such knowledge, the prairie farmer is possessed of an ideal to which he can always be getting nearer and nearer in the management of his holding. But if he commences operations with no agricultural knowledge at all, or only with that which he may have acquired on the prairie itself, he is far less advantageously circumstanced, and must be dependent on external influences for any improvements in his practice; whereas the farmer who has taken with him the effects of a good training, will find his own mind continually suggesting to him desirable modifications based on the recollections of past experience. The marked contrast of the seasons, and the uneven distribution of labour throughout the year, may no doubt be cited as points in which the prairie must ever differ from the old country; but, independently of these, the farming of the prairie must continue, it may be slowly, but none the less surely, to approximate in its character to the best types of English practice,—even as the farming of Ontario is obviously doing to-day. The general maintenance of stock, for example, will go a long way towards affording occupation for the winter months, over and above that which is concerned with the hauling of wood and corn, threshing, fence-making, blacksmith's work, repairing houses and buildings, shooting and fishing, as at present, and may even create for winter labour a demand which does not now exist.

X.—*The late Dr. Voelcker.* By Professor J. H. GILBERT, LL.D., F.R.S., &c., Harpenden, St. Albans.

THE Members of the Royal Agricultural Society of England, at home and abroad, will naturally look for some notice of their late Consulting Chemist in the first number of the 'Journal' which appears after his lamented death. The Chemical Committee requested me to prepare such a notice. I had considerable misgiving lest I should not have sufficient leisure for the adequate performance of such a task, but I felt I could not

decline to undertake the duty of endeavouring to do some justice to the memory of my most intimate scientific friend.

I fear, however, that more will be expected of me than I am at all able to accomplish. Some account of the personal history, so to speak, of one who has been so well known for so many years, not only to the readers of the 'Journal,' to which he contributed so much, but to a great number of the members of the Society throughout the country, will of course be desired; and not the less acceptable will be such an account to his numerous former college students and laboratory pupils, many of whom are distributed in distant countries. But something also as to his work, undertaken for the progress of Agriculture, and of his



influence on that progress, throughout his career, will doubtless be looked for. Indeed, the plan I contemplated was to attempt to give a brief outline of the scope and results of his indefatigable labours. But on looking over his numerous papers and published lectures, the very wealth of material available for such a purpose, showed it to be quite impracticable to attempt to give any systematic account of it. I trust, therefore, that the readers of the 'Journal' will be satisfied with the very instructive narrative of the life of their late friend and teacher, and such reference to the work he accomplished, as may guide them to search for themselves among the stores of knowledge embodied in his own very voluminous writings.

The subject of this memoir, John Christopher Augustus Voelcker, was born on September 24th, 1822, at Frankfort-on-the-Maine. He was the fifth son, in a family of seven sons and one daughter, of Frederick Adolphus Voelcker, a merchant of that city, who died when his fifth son was only eleven years old. During his years of boyhood, Augustus suffered from very delicate health, which greatly retarded his early education. This he obtained at a private school in the town. At the age of about 22 he went to the University of Göttingen, chiefly for the purpose of studying chemistry under Professor Wöhler, and to work in his laboratory, where perhaps a greater number of able chemists have been trained than in any other chemical school, even in Germany. The pupils of Wöhler, whose laboratory maintained its reputation until his death in 1882, are indeed to be found in responsible positions in every quarter of the globe, and in large numbers in the United States.

At Göttingen young Voelcker took the degree of Doctor of Philosophy in 1846, the subject of his inaugural dissertation being the composition of tortoise-shell, which he had investigated in the laboratory. From Göttingen he paid a short visit to Giessen; where Liebig, who almost throughout his career carried on investigations conjointly with Wöhler, had established a school of chemistry, which also brought pupils from all parts of the world. Liebig had too, at that time, for some years paid special attention to the application of chemistry to agriculture, and had already published his two memorable works on that subject.

Whilst Dr. Voelcker was at Göttingen, he seems to have devoted his attention chiefly to the investigation of some of the compounds of manganese, and of some other metals, for in 1846 he published four papers, in German and Dutch scientific journals, on his experiments on those subjects. In the same year he also published, in German journals, a paper on the occurrence of mannite in the roots of *Triticum repens*; and one on the analysis of poppy-oil.

It was also whilst he was still at Göttingen, that Professor Mulder, the distinguished Dutch chemist, paid a visit to Wöhler at that place; and, on Wöhler's recommendation, Mulder engaged Voelcker as his principal assistant, and he accordingly returned with him to Utrecht, where he remained for some time. Mulder devoted much attention to certain branches of physiological chemistry, especially in their relations to vegetable and animal production, and he embodied the results of his investigations in a work published about 1844, which was translated into English by Dr. Fromberg, and brought out in parts, commencing in 1845, and which appeared under the title

of 'The Chemistry of Vegetable and Animal Physiology.' Dr. Voelcker assisted Mulder in his various investigations, and it was doubtless this work, and the connections into which it led him, that gave a direction to his future studies and labours—to which, in fact, his devotion to agricultural chemistry owed its origin and its stimulus.

At Utrecht, Dr. Voelcker commenced the investigation of some of the albuminous compounds, and he continued the inquiry from time to time for some years afterwards; but the only record of this work which has come under my notice was in papers given at the Meetings of the British Association for the Advancement of Science; in 1855—"On Caseine, and a method of determining Sulphur and Phosphorus in Organic Compounds in one operation;" and in 1857—"On the proportion of Organic Phosphorus in Legumine."

During Dr. Voelcker's stay at Utrecht, Professor James F. W. Johnston, of Edinburgh, who was Chemist to the Agricultural Chemistry Association of Scotland, afterwards incorporated with the Highland and Agricultural Society of Scotland, paid a visit to Mulder, and he induced Dr. Voelcker to go to Edinburgh to take charge of the laboratory of that Association. He went to Edinburgh in February 1847, and remained there until August 1849; with the exception that he spent from November 1848 to February 1849 at Durham, at the University of which place Johnston was Professor of Chemistry, and for whom he lectured, and worked in the Laboratory, there.

At Edinburgh the whole responsibility of the position, both as analyst and consulting chemist, frequently devolved upon him, Professor Johnston spending much of his time at Durham, or being otherwise engaged. It was under these circumstances that he first gained experience in the requirements of practical Agriculture; for it was here that for the first time he found himself constantly in communication with practical farmers, learning from them their wants, and investigating and advising on the problems they brought before him for his solution. Trained in analysis in the best schools of the time, himself an acute observer, and having an eminently practical turn of mind, the responsibility of his position greatly tended to develop his powers, and to give him that self-reliance which was his characteristic through life; and which, thoroughly sustained by knowledge, industry, and conscientiousness, contributed in no small degree to his success as a teacher, a scientific adviser to the practical farmer, and in his Profession as a Consulting Chemist generally.

During his stay in Edinburgh, he made the acquaintance of

the late Professor George Wilson, in whose private laboratory he worked for a short time, with whom he was on terms of the closest friendship, and for whom he always entertained the highest regard, owing to him, as he was wont to say, guidance which materially influenced him through life.

In August 1849, after spending about two and a half years at Edinburgh, Dr. Voelcker was appointed Professor of Chemistry at the Royal Agricultural College, Cirencester; and from this time began a still more active life of lecturing, writing, and experimenting. His income at the College was small, but he supplemented it by writing, and by analytical work. The articles on Chemical subjects in Morton's Cyclopædia of Agriculture, from the letter M. to the end, were contributed by him. It seems appropriate here to refer to the fact that, although a German, there was scarcely a trace of foreign idiom ever observable in his written English, which was remarkably clear. The facility of so writing was, however, only attained by great determination. Finding that speaking his own language in the family interfered with his freedom in lecturing and writing in English, he entirely gave up speaking German.

It was about, or soon after this time, that he contributed papers on various subjects of investigation to some Scotch Scientific and Agricultural Journals. For example—to the 'Edinburgh New Philosophical Journal'—"Analysis of the Anthracite of the Calton Hill, Edinburgh." To the 'Annals and Magazine of Natural History'—"On the Chemical composition of the fluid in the ascidia of *Nepenthes*." "On the composition of the ash of *Armeria maritima*, growing in different localities, with remarks on the Geological distribution of that plant, and on the presence of Fluorine in Plants." "On the watery secretion of the leaves and stems of the Ice Plant." To the 'Transactions of the Highland and Agricultural Society of Scotland:' "The chemical composition of the seed of *Chenopodium quinoa*." "Composition of house-coal soot." "On artificial manures in general and bone manure in particular." "The effects of burnt clay as a manure." "On the comparative value of White Scottish, and Black English Oats;" and "On the Composition of Rice Meal."

In 1852 Dr. Voelcker went to Frankfort to be married, and he returned to Cirencester with his wife. Mrs. Voelcker, four sons, and one daughter survive to mourn his loss. His eldest son, George, died in 1876, at the age of 23, after having prosecuted his studies in Medicine with great industry and success, and nearly completed his course, with apparently a career of much promise before him. He had contracted diphtheria in

the discharge of his Hospital duties, and died after a very short illness. His loss, especially under these painful circumstances, was always most keenly felt by his father.

In 1855, Professor Voelcker was appointed Consulting Chemist to the Bath and West of England Agricultural Society; and he held the office up to the time of his death, a period of nearly thirty years. In this capacity he gave lectures at various places from time to time, instituted field and other experiments, conducted much laboratory investigation, and contributed papers to the 'Journal' of the Society.

In 1852 his first paper in the 'Journal of the Royal Agricultural Society of England' appeared. He also contributed one in 1855, one in 1856, and one in 1857. In that year, 1857, he was appointed Consulting Chemist to the Society; and from that time to the date of his death, about twenty-seven years, he contributed one or more papers to every half-yearly number of the Society's 'Journal.'

For about six years after his appointment as Consulting Chemist to the Society, he still retained his Professorship at Cirencester; and he availed himself of the opportunities which the College farm afforded, for carrying out various experiments, at the homestead and in the field, which were supplemented by collateral laboratory investigations. He had already commenced an investigation into the composition of farmyard-manure, and as to the changes it undergoes in keeping under various circumstances; and this enquiry he continued and extended from time to time. Thus, he took up the question of the composition of the drainings from dung-heaps, and of the loss of manure involved; also of the changes which liquid manure undergoes in contact with different soils of known composition, of which he made and published the analyses.

From the results obtained in these enquiries, he was led to investigate the absorptive powers of the different soils of known composition;—for *ammonia*, from its solutions as caustic ammonia, carbonate, and sulphate of ammonia, and as chloride of ammonium;—their absorptive power for *potash*, from its solutions as hydrate, carbonate, sulphate, and nitrate, and also as chloride of potassium;—their absorptive power for *soda*, from its various combinations, and so on. And, following up the same line of enquiry, he determined the changes which soluble phosphates undergo when in contact with different soils.

He conclusively proved the absorption of ammonia by soils, by recovering some of that which had been taken up, by washing it out again with large quantities of water. But subsequent results of his own and others, showing how readily ammonia is oxidated into nitrates in the soil, would doubtless

modify the conclusions at first drawn as to the degree in which ammonia was absorbed.

As the result of the whole enquiry, he called attention to the fact that the most important soluble constituents of manures are rendered less soluble, but not quite insoluble, when applied to the soil.

As already intimated, he instituted numerous field experiments with different manures, on different crops, on the College farm, and in the conduct of these he was very materially aided by his friend and colleague, Professor Coleman, now of York. He also, not long before he left Cirencester in 1863, endeavoured to enlist the co-operation of intelligent practical farmers in different localities in the conduct of field experiments, and as time went on he carried out the plan more and more systematically. In most, if not all, cases of such field experiments, he made a complete analysis of the soil upon which the experiment was to be conducted.

In his reports of field experiments he conscientiously recorded failures as well as successes, and he was very careful not to draw general conclusions from results obtained on land of one description in a given condition from previous treatment, or in one season only. Thus, we find him saying, in reference to one such result: "In dry and unfavourable seasons, the very best manures are much more likely to do harm than poor or indifferent fertilisers." Again: "In a bad and very dry season, it is well known that concentrated artificial manures often do harm to crops, whereas no injury to them results from the application of indifferent and all but valueless compounds sold as artificial manures." And again: "Agricultural experiments are of little or no practical utility unless they are continued from year to year for a long period, and tried on a variety of soils in good and bad seasons in a manner which allows us, if not to eliminate, yet clearly to recognise, the disturbing influences of climate, season, condition of soils, and other circumstances, which often affect the produce in a higher degree than the manures on which we experiment. A single field experiment is as likely to lead us in a wrong as in a right direction."

Still, much useful information as to the actual and comparative value of the different artificial manures in the market, and of their aptitude to different soils and to different crops, was brought out by the results of the very numerous field experiments that were so made under his direction.

Nevertheless, he hailed with much satisfaction the inauguration of the more systematic series of field experiments now in progress at Woburn, conducted there on behalf of the Royal

Agricultural Society, at the instance, and at the cost, of His Grace the Duke of Bedford. These experiments were commenced in 1877. In the following year the conduct of them devolved entirely upon Dr. Voelcker himself, and to the last he took the deepest interest in their management, and in their results. The main series, those in Stackyard Field, have been conducted with the greatest care; and if those in whose interest they were devised, and have been carried out hitherto, are not in too great a hurry, and kill the goose before the golden egg is laid, results of much importance will doubtless be attained. From the other field experiments at Woburn, arranged and conducted with less regard to the previous history and uniform character and condition of the land, less can be expected. Of this, Dr. Voelcker was obviously fully conscious; for one of his last Reports, that in which he gives the results of the experiments on Barley in Lansome Field in 1882, after swedes fed off with cake and corn in 1881, he concludes as follows:—

“It may be laid down as a good rule, that no legitimate conclusion as regards the efficacy and value of manures can be drawn from results obtained in field trials with manures, whenever the produce of two unmanured plots in a series of field experiments shows differences as great as the above differences between the average yield of the variously manured and unmanured plots. The natural variations in the productive powers of the four experimental acres in Lansome Field have probably more to do with the variable harvest-results in 1882 than the manures which were applied to the swede-crop in the preceding year.”

Very soon after he had devoted himself to Agricultural Chemistry, Dr. Voelcker commenced to pay attention to the various aspects of the subject of the *Feeding of Animals*. He had not the same facilities, either for conducting feeding experiments himself, or for arranging with others to conduct them, that he had in the case of field experiments with manures. He, however, not only wrote and lectured on the chemistry of the feeding process, but he analysed a very large number of food-stuffs, both home-grown and imported. He determined the composition, in much detail, of most of the crops grown on the farm as food, of new plants proposed to be grown as food-crops, of hay, of various descriptions of straw, of certain refuse matters, and so on; discussing at length their actual and comparative feeding-value, as deduced from the results of his laboratory investigations.

But perhaps the most essential service he rendered, not only to the Members of the Society, but to farmers generally, in con-

nection with the composition and value of food-stuffs, was by his most elaborate investigations, microscopic and chemical, of the various matters entering into the composition of feeding-cakes, by his numerous analyses of the various cakes themselves, and by his fearless and persistent exposure of what he considered injurious, or against the feeder's interest, in the manufacture or composition of such articles, whether resulting from carelessness, ignorance, or fraud.

There can, indeed, be no doubt that, both in the matter of purchased manures and purchased food-stuffs, his analyses, papers, and reports, have done much to raise the standard of such articles, and to leave no one to blame but the purchaser himself, if he does not get value for his money. There is scarcely an article of import to the farm, respecting which the intelligent farmer does not now know on what constituents its value depends, and what percentage it should contain; and with the facilities at his command for having the composition determined at a trifling outlay, it is his own fault if he allows a relapse from the present much improved condition of things, the result of the widely disseminated improved knowledge which now prevails, compared with the comparative ignorance of not many years ago.

In reference to this subject it seems appropriate to call attention here to the rapidly increasing rate at which the members of the Society do avail themselves of the facilities placed within their reach for obtaining trustworthy analyses. The following Table shows the number of analyses executed for Members in each of the twenty years from 1865 to 1884 inclusive, as gathered from the annual Reports of the Consulting Chemist:—

Number of Analyses made for Members.

1865	312	1875	704
1866	335	1876	720
1867	341	1877	642
1868	432	1878	724
1869	465	1879	1018
1870	580	1880	1201
1871	730	1881	1058
1872	657	1882	1403
1873	670	1883	1453
1874	645	1884	1628

It should be observed that it was in 1879 that the Society's Laboratory in Hanover Square was first opened, and that the conditions under which analyses could be obtained were revised; and it will be seen that the number of analyses required by Members has considerably increased from about that time. After all, however, the numbers are comparatively small con-

sidering the number of Members the Society includes ; but it is high as representing the degree in which guarantee of value is increasingly sought, or analytical knowledge is increasingly appreciated.

The foregoing list does not, however, at all adequately represent the extent to which such knowledge is had recourse to by the agricultural interest at large. A very large, and largely increasing amount, of analytical work is done, not only for farmers themselves, but for the importers or manufacturers of the articles they need, in the numerous private laboratories, several of which have been established by those who have been trained by Dr. Voelcker himself, in his own private laboratory in Salisbury Square. Finally on this point, it is of interest, and it is at the same time significant of the good that has been accomplished, that in his Reports Dr. Voelcker has occasionally referred to the increase or diminution in the number of analyses of individual articles, as indicating the prevailing doubt or anxiety as to their quality at the time, or the admission of substantial improvement as the result of investigation or of public discussion.

The subject of *Milk* and the *Dairy*, which is one of rapidly growing importance to the British farmer, was early taken up by Dr. Voelcker. In connection with it he executed a great amount of analytical work, made many experiments in dairy management, gave several lectures, and published not a few papers recording existing knowledge, and the numerous results of his own investigations.

His first paper on the subject in this 'Journal' appeared in 1861. In it were recorded the results of nearly seventy analyses of milk, cheese, and whey ; including those of new milk, of eleven different descriptions of cheese, and of many samples of whey. The various stages of the manufacture, and the practical mistakes frequently committed in the conduct of them, were discussed. In 1862 he published the results of numerous actual experiments in the making of cheese—from whole milk, from partially skimmed milk, from skimmed milk, and from new milk with cream added. He gave the analyses of the cheese, in some cases of the whey, and in some of the original milk also. In 1863 he published a paper in this 'Journal,' entitled 'Milk,' in which he discussed the physical and chemical characters of milk, its chief organic compounds, and their composition, and the composition of its mineral matter ; described dairy arrangements ; gave the composition of cream, of skimmed milk, and of whole milk under different circumstances of production, as to the period of the milking, the time after calving, drawn morning or evening, at different seasons of the year, with

different foods, and so on; and finally treated of adulteration, and of the means of detecting it.

His investigations into cheese-making were practical as well as scientific; and most readers of agricultural newspapers will remember how he responded to the taunt of a farmer's wife that he could not make a cheese himself, by actually making a better cheese with the aid of a thermometer than she did by guessing the temperature with the aid of her fingers. One recorded result was the immediate use of the thermometer in all the best dairies in the district.

To come down to more recent dates, and to his work during the period of the much-increased interest in milk and dairy produce which has been developed during the last few years:— It may be mentioned that he has been connected with the 'British Dairy Farmers' Association' from the time of its institution; that he has contributed papers to its 'Journal;' and that he has conducted the milk and dairy trials at its annual Shows. The work and the publications of the Association, and Dr. Voelcker's contributions to them, are matters of such recent history, and are so well known to all interested in the subject, that it would be out of place to refer to them here in any more detail.

These references to special subjects of investigation, bearing directly on important agricultural practices, must suffice as illustrations of the thorough manner in which Dr. Voelcker sought to elucidate the connection between practice and science, in his capacity of adviser to the Members of the Society. The subjects referred to by no means exhaust the list of those he investigated and reported upon, as the pages of the 'Journal' amply show. Thus, he discussed the properties of soils in other aspects than those which have been mentioned; the composition and value of town-sewage, and also of earth-closet manure; the chemistry of sugar-beet; the chemistry of drinking-waters; and other subjects. He also reported on the agriculture of several continental countries.

From time to time Dr. Voelcker contributed papers to the Chemical Society, and in some cases he gave the same results in less technical form in the 'Journal of the Royal Agricultural Society.' Of those communicated to both Journals, the one involving by far the largest amount of laboratory investigation, and leading to the most important conclusions, both practical and scientific, related to the composition of the waters of land-drainage, and to the loss of plant-food thereby. In the course of this enquiry, he had made between sixty and seventy complete analyses of the drainage-waters collected at different times from more than a dozen of the differently manured plots in the

experimental wheat-field at Rothamsted. Among the nineteen numbered paragraphs of conclusions given at the end of his paper in the Society's 'Journal,' a large number relate to the loss of nitrogen as nitrates in drainage-waters, a subject which has also been fully illustrated in Rothamsted papers. But the determination of all the mineral constituents in so large a number of drainage-waters of known history, as to the manuring of the soil, and as to the crops grown, is a work at once of immense labour and of great value, which has not been undertaken by any one else. It must suffice here to quote one paragraph of Dr. Voelcker's conclusions, relating to the susceptibility or otherwise to loss, of the mineral constituents by drainage:—

“Whilst phosphoric acid and potash, which are the most valuable components of soils and manures, are retained in the land almost entirely, lime, magnesia, sulphuric acid, chlorine, and soluble silica, or the less important, because more abundant and widely-distributed, mineral matters, pass into the waters of land-drainage in considerable quantities.”

In the earlier years Dr. Voelcker frequently contributed papers at the Meetings of the British Association for the Advancement of Science. He was elected a member of the Chemical Society in 1849; was several times a member of the Council of the Society; and was one of its Vice-Presidents at the time of his death. He was elected a Fellow of the Royal Society in 1870. He was one of the founders, and one of the first Vice-Presidents, of the Institute of Chemistry of Great Britain and Ireland, established in 1877. It may be added that he was elected a Member of the Athenæum Club in 1881.

Referring to his connection with specially Agricultural Institutions:—he was Honorary Member of the Royal Agricultural Society of England, of the Royal Agricultural Society of Hanover, and of the Imperial Agricultural Society of Vienna. He was Examiner in Chemistry to the Royal Agricultural Society of England, and to the Royal College of Veterinary Surgeons. He was a member of the Board of Studies of the Royal Agricultural College at Cirencester, and in 1882, he was appointed Honorary Professor at the same College, an appointment which, however, only required the delivery of one lecture annually. As already mentioned, he was for thirty years Consulting Chemist to the Bath and West of England Agricultural Society,—a position in which his son, Dr. John Augustus Voelcker, succeeds him. He was Consulting Chemist to the Lincolnshire, and to some other Provincial Agricultural Societies. He was for many years an active Member of the London Farmers' Club; and perhaps the highest testimony to the appreciation of

his scientific labours among the most intelligent of practical agriculturists, was the fact of his election as Chairman of the Club in 1875. Both before and since, he was a frequent attendant at the Meetings of the Club, contributed papers from time to time, and frequently took part in the discussions.

As is well known, on coming to London in 1863, in addition to his duties as Consulting Chemist to the Royal Agricultural Society, Dr. Voelcker commenced private practice as Consulting Chemist generally, and established the Laboratory in Salisbury Square, which is still carried on by two of his sons (Dr. John Augustus, and Mr. William Voelcker), who were his partners before his death. He very soon acquired considerable repute in this capacity, and gained a very extensive practice, not only in connection with Agriculture, but with many other Industries, and he was frequently engaged on important trials. In addition to such cases, he was from time to time called upon to give evidence before Parliamentary Committees, or Royal Commissions, in relation to such matters as Gas, Water, and Sewage Bills, the Agricultural Holdings Act, River Pollution, and so on. He was one of the Jurors of the International Exhibition of 1862, of the Fisheries Exhibition in 1883, and of the Health Exhibition in 1884.

Such is a brief and very imperfect outline of the extremely active and extremely useful career of Dr. Augustus Voelcker, late Consulting Chemist to the Royal Agricultural Society of England. There is every reason to believe that those who have been responsible for the arrangements of the Society in the interest of its Members, have felt that the duties to which they appointed him could not have been better performed than he performed them. There can, indeed, be no doubt that he succeeded in a remarkable degree, not only in the furtherance of actual improvements in practice in accordance with scientific principles, but in thoroughly gaining the confidence of the practical farmer, and securing his appreciation of the aids which practice can derive from science.

Not the least of the services which the late Dr. Voelcker has rendered to British agriculture is the training up of a number of analysts and consulting chemists, including two of his own sons, who devote themselves specially to the applications of chemistry to agriculture. Several of these were, indeed, in a position to come forward as candidates for the office in the Society which his death vacated, with no inconsiderable claims for consideration. The responsibility of succeeding him, and of maintaining and extending the union of "*Practice with Science*," which his father kept so steadily in view throughout his career, has devolved upon his eldest surviving son, Dr. John

Augustus Voelcker, who, to ensure success, has only to profit by the training and example of which he has had the advantage.

It can hardly be inappropriate, even in an *Agricultural Journal*, to refer to other qualities than scientific attainment, indefatigable industry, and integrity of purpose and conduct, which contributed to form the character as a whole of our lamented friend. From the time of his residence in Edinburgh on first coming to this country, he took very great interest in religious movements of various kinds; and so earnest was he in such matters, that when the Laboratory in Hanover Square was opened he made it a stipulation that he should be free on the days of the meetings of the Committee of the British and Foreign Bible Society, at which he had previously been, and was afterwards, a constant attendant.

There can be little doubt that his life was shortened by overwork. On Sunday, December 23, 1883, he had a not severe attack of paralysis, but it was such as to indicate that absolute rest was essential for some considerable time. The Council of the Society showed every consideration in the matter, and requested him to devote six months to the restoration of his health. As soon, however, as he felt some recovery of strength, it was impossible to restrain him from returning more or less to his active duties. He had no return of paralysis, but in August, 1884, symptoms of heart disease, with other complications, supervened. From this time he never really rallied, and he died on the morning of December 5. For some weeks he had suffered intensely; and on the occasion of my last visit to him, not many days before his death, his sufferings were indeed very painful to witness. His mind was, however, perfectly clear; he fully recognised his position, and was entirely resigned to it. He passed away quietly, and without any pain towards the last.

It only remains to call attention to the portrait which accompanies this notice on p. 309. To those who knew him, it will serve as a very pleasant reminder; and to those who did not, it will convey a faithful impression of him as he was in his days of health and active life.

XI. Annual Report of the Honorary Consulting Entomologist for 1884. By Miss ELEANOR A. ORMEROD, F.R.Met.Soc.
Dunster Lodge, Spring Grove, Isleworth.

I BEG leave to submit an abstract of the work of the season from November 1883, up to the present date, of December 1884.

Inquiry correspondence was continued throughout the winter, and increased to the amount of about twenty-five letters a week in May and June, and reference still continues almost daily, especially with regard to the warble-fly investigation. The points of communication have been in some degree regarding attacks on Colonial produce, but mainly on crop attacks in England; there has been communication in a lesser degree from Scotland, and much more than in previous years from agriculturists in Ireland. Inquiries have been sent regarding "green fly" on cabbage and turnip, and prevention of ravage of daddy-longlegs grubs, which have been very destructive amongst corn and other crops; also regarding the red maggot of the wheat-midge in corn, and the same and nearly allied species in seed (grown for sale) of meadow foxtail grass; likewise regarding thrips in wheat.

Hop aphid has been well observed and reported upon from the latter part of March until September.

Mangold-maggot, and the rare attack of the mangold and beet carrion-beetle have been under notice, and onion-maggot has been practically attended to.

Turnips suffered badly in many places from surface caterpillars, the injury continuing up to the beginning of this month, and in a few places from attack upon the leaves of the small but very destructive caterpillars of the diamond-back moth.

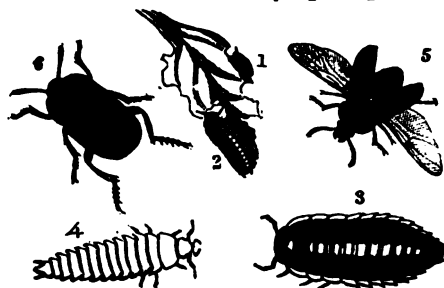
Wireworm and turnip "fly" or "flea-beetle" have been bad in various places; but little inquiry has been sent in regarding them, therefore it may be hoped that the information published by the Society may have been found serviceable for reference.

Communication has taken place regarding many other crop and fruit attacks, and some inquiry has been made relative to the water-snail, *Limnæus truncatulus*, in connection with liver-fluke. Sound and valuable information has been contributed regarding ox warble-fly, and observations are being continued on a system which cannot fail to give most of the information still needed.

With regard to some of the more uncommon of the above attacks, it may be well to observe that the presence of the

mangold- or "beet-carrion-" beetle has been supposed to arise from offal or portions of dead animals (which the beetles for the most part feed on) being mixed with the manure. The attack has so rarely been observed, that it would be very desirable to stamp it out at once, and I endeavoured to give all necessary information.

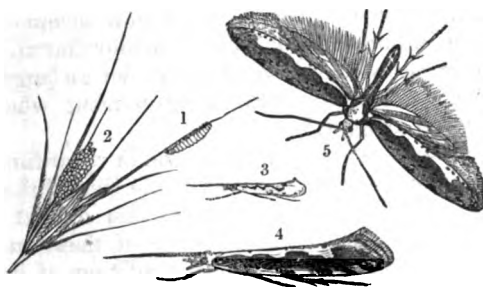
Fig. 1.—*Beet-carrion Beetle* (*Silpha opaca*, Linn.).



1 and 2, young and full grown larvae; 3 and 4, larvae magnified; 5, female beetle flying; 6, male beetle, slightly magnified.

The diamond-back turnip-moth has again appeared in large numbers in some of the same districts (namely, the North of England and N.E. of Scotland) where it appeared last year. The caterpillar feeds on many plants (both cultivated and wild) of the cabbage kind, notably on the common weeds called Jack-by-the-hedge, hedge-mustard, and others—it turns to chrysalis on

Fig. 2.—*Diamond-back Moth* (*Cerostoma xylostella*, Curtis).



1, caterpillar; 2, eggs; 3-5, Diamond-back Moth, nat. size, and magnified.

the food plants or on the ground, and the moths from the autumn chrysalis do not come out till spring. It would therefore seem desirable, where attack is constant, to see whether destroying the weeds, and breaking up the surface of waste land where they grow, might not reduce attack. Injury from

this caterpillar is liable to spread as quickly and be as severe as that from caterpillar of turnip-saw-fly or "niggers."

With regard to the nature of the small maggots infesting the seed of meadow foxtail-grass (*Alopecurus pratensis*) which

Fig. 8.—Anchor Processes,
much magnified.



Red Maggots.

1, From Wheat; 2, 3, Foxtail Grass.

was left for further investigation in February, I am able now to report that these are of three kinds of "red maggot" or midge-grubs. One kind is indistinguishable from the common red maggot of the wheat-midge, the *Cecidomyia tritici*, and the others differ in one case in the forked ends of a small process below the head, sometimes known as the anchor process, being bluntly pointed, whereas in the wheat-midge maggot it is lunate, and in the other this process is absent.

The small yellow two-winged midges that were captured were almost, but not quite precisely, like the wheat-midge; and on submitting them to Mr. R. H. Meade, he informs me that they may possibly be a smaller variety of the wheat-midge, but more probably be an undescribed species; it is necessary to have males as well as females for certain identification.

Practically considered, however, we find three kinds of maggots, one corresponding so exactly in appearance with the common red maggot, and all so similar to this in their habits (as far as reported), that the attack appears to lie under the same means of prevention as those already known to be serviceable against this crop pest.

The attack, as noted, is usually much more severe on the home-grown than on imported seed, and I consider that this *Alopecurus pratensis*, or meadow foxtail-grass, if grown in large quantities, would be very likely to infest neighbouring wheat with its varieties of "red maggot."

A little communication has been sent in regarding the water-snail, *Limnæus truncatulus*, the host of the liver-fluke in its transition stage; and it is to be regretted this subject is not more followed up, as the amount of presence of these snails is often enormously increased by a neglected condition of cattle ponds, cisterns, and ditches, which is highly favourable to their increase, and undesirable in every point of view.

The most important communications, however, of the past season have been on the subjects of hop aphid and of ox warble-fly.

Regarding hop aphid, it has been shown by observations forwarded (with specimens accompanying) from the latter part of

March onwards, that attack begins on the hop with its first growth in early spring, by means of wingless females depositing living lice, which have come up from the hills.

Also the opinion of a large number of hop-growers, and of various skilled entomologists, that attack of "fly" (that is, of winged hop aphid, which usually occurs towards the end of May) comes on the wing from sloe and damson, as well as from other hops, has been so much confirmed, that I see no reason to doubt its correctness; and after careful study of specimens forwarded from many localities, during the period from the latter part of March to September, I cannot see any reason for considering the "hop aphid" and the "damson hop aphid" other than slight varieties of one and the same species. In this I refer to the *Aphis* (*Phorodon*) *humuli* (Schrank.), and the *Aphis* (*Phorodon*) *humuli*, var. *Malaheb* (Fonsc.), and not at all to the "Plum aphid," the *Aphis* *pruni* (Reaum.), or any other kind than those specified.

I have prepared a paper with full details of the information sent in, and figures accompanying for publication in my yearly Report, and distribution in pamphlet form previously to the contributors, so as to be in time for spring operations.

With regard to prevention of attack, it has been found by experiment on the acre of hop-land at Stoke Edith Park, near Hereford, of which the use has been given by the courtesy of Lady Emily Foley, that various applications to the surface of the hop-hills about the time of dressing in spring, entirely prevented the appearance of wingless females or lice on the bines of these hills (though the others in the ground were infested), until the attack came on the wing at the end of May. Of these applications, paraffin, mixed with ashes, or with earth, shoddy, or other dry material, answered the best; the bines on the hills so treated were reported thriving throughout the season, up to good bearing.

Various methods of combining paraffin or other mineral oils with soft-soap and water so permanently, that the mixture may be diluted without again separating into oil and water, are stated to have been found serviceable for destroying aphides in the experiments made under direction of some of the State entomologists of the United States of America; but, from personal experiment, it seems to me so difficult to find the exact strength suitable for killing the insect, without risk to the plant, that I should be afraid at present to advise this application to the hop-leafage. As a watering, or as a more convenient method of applying paraffin, in the attacks for which it is now used (as of mangold-fly, for instance), the plan of mixing is likely to be useful.

I have verified the method of mixing by personal experiment, and find it very simple, and shall be happy to give details to all applicants.

Quassia has been acting well during the last season as an addition to the common soft-soap hop-washes.

Paris green was tried at my request, and failed to have any effect on the hop aphides.

A method of hop-washing by steam-power has been introduced near Tunbridge Wells, which has, as yet, only been tried on a limited scale. So far it is stated to be successful, and to have the advantage of washing a much larger acreage at a less cost per day than can be done by hand or horse engines.

Many other communications have been sent in, of which the following refer to points of practical interest.

With regard to the caterpillars of the "winter moths," which are exceedingly destructive to leafage of fruit-trees, the recommendation given to prevent egg-laying by putting bands of sticky material round the trees has answered thoroughly. The infested trees were painted round the stem in December with a band of Davidson's composition, laid on for about the width of a foot. The female moths (which have only abortive wings) were thus caught by hundreds on their way up the trunks from the ground, and the trees which had been so infested for several years that leafage and blossom were destroyed, were this season preserved from attack.

Fig. 4.—*Winter Moth*
(*Cheimatobia* *brumata*, *Stephens*).



Male winged. Female with abortive wings.

This simple remedy, if applied early in winter, would save much loss in fruit-growing districts.

Specimens of a large kind of daddy-longlegs grub, which is to be found in muddy localities, were forwarded to me from the neighbourhood of Stroud, Gloucestershire, with inquiry as to their nature, they being found in the drinking-water supplied through pipes. The water was very foul; and it having been incidentally mentioned the household were ill, and they were obviously unaware of their danger, I telegraphed to stop the use of the water, and reported the case to the health officer at Stroud, who inspected, and stated that the water was unfit for use. It appeared that a cattle-pond had been made across the course of the supply-pipes in a neighbouring field, and thus the water was carried in pure on one side, and transferred foul on the other for household purposes. It is so eminently desirable that care

should be taken to keep water-supply free from farm filth, that I venture to report this attack, though it is not in the province of crop-pests; and, if no other senses show presence of mischief, the appearance of grubs should draw attention to it.

I beg also to suggest (in consequence of communications received) that when large masses of vegetable material, be they English or imported, are found so infested with unknown grubs that they are (as reported) "only fit to throw to the manure-heap," that this is the precise place they should *not* be thrown to. It is important that all such material *should be burnt*; no other course secures us against importation of destructive pests.

A new and very important branch of observation has been brought forward in the applications of various seedsmen relatively to infested seed. Inquiries have been sent in respecting to the so-called "Death Watches," infesting dry, uncleaned seed. Mites, showing the grass-seed wherein they were housed was damp, and needed stirring; likewise regarding red maggot in grass-seed, some of which being alive, leaves it quite open that the attack might be sown with the seed.

Likewise turnip-seed sold as steeped to kill the turnip-"fly," or its eggs *within the seed*, was reported. I explained that the "fly" could not possibly be destroyed in this way, as none of its life is passed in the seed. Benefit is very likely to arise from steepings that will kill eggs or grubs mixed in seed; but with regard to this special case, the error is one of so much practical importance, that it is desirable to draw attention to it.

Many inquiries have been sent in as to methods of obtaining intelligible practical information as to the habits, and means of prevention of ravage, of farm insects.

There is a great wish abroad for practical lectures expressed from various places by members of the Farmers' Clubs, and also help is sought at some of the schools in agricultural districts.

In the latter case, I am able to be, in some slight degree, of assistance by correspondence; but it would be of great benefit if a competent visitor attended even once a year, not so much for examination as to save much waste of labour, by giving the requisite guidance as to the points on which information is most needed for practical farm use.

In consequence of the large amount of inquiry from correspondents regarding the chief successive attacks which recur each year, I am preparing "Notes" regarding respectively mangold-maggot, daddy-longlegs, and warble-fly. These give a figure of the insect, together with a short history of its habits, and the means which commonly are found serviceable for the prevention of its ravages—and are purposed to be enclosed to

correspondents, together with the written reply regarding the special points of inquiry.

I beg to acknowledge, with thanks, assistance in the identification of tropical or other insects with which I was not acquainted, always most courteously rendered on application by Professor I. O. Westwood, Life President of the Entomological Society, and likewise regarding minute injurious Diptera, by Mr. R. H. Meade.

According to the wish of the Society, I have been endeavouring to gain all the information in my power likely to prove useful in lessening the great amount of injury caused by warble attack, both to living cattle and also to the hides. I am happy to say that so much interest is taken by those practically well qualified to assist in the investigation, that there is reason to hope we shall soon have all the information needed.

The first appearance of the warble is now beginning. On November 13th, Messrs. Hatton, of Hereford, forwarded me a piece of newly flayed hide, with the first commencement of the swelling showing on the flesh side. A little later, similar specimens were sent me removed from the flesh side of a hide sent in at Birmingham; and on December 5th, two were found on the flesh side of the hide of a bullock killed the previous day at Spring Grove, Isleworth. In these cases the swelling had not yet affected the outside of the hide, but on December 4th, I heard from Mr. Byrd, Spurstow Hall, Tarporley, Cheshire, that on examination of his cattle he found many lumps, though not yet large. The first appearance of the warble on the flesh side of the newly flayed hide, shows as a small swelling or lump, of a blue or leaden colour, about as large as if half a good-sized shot were beneath the subcutaneous tissues, this swelling being greatly inflamed round.

Within this swelling the maggot is to be found advanced so far that it has already gained a skin beset with patches of minute prickles, and likewise the spiracles or breathing spores, which show, when the maggot is more developed later on, as two black tips lying at the opening of the warble.

The maggots in the hide sent were of blood colour, from the material in which they were feeding, and excessively minute and delicate. I was only able to disengage them in portions by dissecting under water, and securing the fragments as they floated away. The nature of the fragments was in all cases perfectly certain by the presence of patches of prickles.

Above the small swelling (which is clearly distinguishable by the bluish centre and inflamed patch) I find a small channel running up to the outside of the hide. This is shown by the blood running along it from the warble on pressure. I find this

may either go in a moderately straight or slanting line through the hide, or may take a semicircular curve—that is, go with a sweep up from the warble and run a little way under the cuticle, where it ends in a distinct cell. From these various circumstances I think we shall find that the maggot hatches just at the outside of the hide, and is now making its way down by the channel, which I find quite fresh and open.

We now need observations of when the appearance of the warble, at beginning, becomes general through the country; and also that all interested in the subject would try the effect of some one or other of the various applications which have been found useful in destroying the maggot in the warble, and report the results.

Touching the warble with a small piece of mercurial ointment, or with tar, mixed as in sheep-salve (or many other applications), all appear serviceable to kill the maggot as soon as the warble is found to be open, showing the black tip of the maggot within. If this is done early in the life of the maggot, we save the drag on the system of the cattle from the sores lasting till early summer, and likewise much of the injury to the hide; for the small-forming sores will soon heal, whereas the large established warble-holes depreciate the value of the hide in all the hands through which it passes.

I beg further to report that information is being sent from farmers in many parts of the country, and most careful co-operation is being given from Aspatria, likewise from correspondents at Wigton, Hereford, and Birmingham, relating to the condition of hides.

The Newcastle Hide Inspection Society is likewise courteously co-operating, and the Colonial Company has given some serviceable information. I was also in communication with Professor C. V. Ridley, State Entomologist, Washington, U.S.A., during his visit to England, and he has furnished some serviceable information as to prevention of attack.

I purpose giving the whole of the information with which I am being favoured (with as full illustrations as possible of the progress of attack) in my next yearly Report, and also in a separate pamphlet for distribution to contributors, and we shall then see what points are needed to complete the subject of practical and simple methods of prevention.

Meanwhile, I beg to add that any information sent me by those conversant with the subject will be gratefully accepted.

XII.—*Annual Report of the Consulting Chemist for 1884.*

I AM pleased to be able to report to the Chemical Committee that since the issue of the last Annual Report the progress then reported in the analytical work, conducted in the Society's Laboratory under my direction, has been not only maintained but largely increased. From 1453, the number of samples analysed for Members of the Society in 1883, the total for the present year has risen to 1628, an increase of 175, and much exceeding any total reached in previous years. In addition to the ordinary analyses, my investigations upon the Chemistry of Ensilage have also occupied a considerable amount of time and analytical work in the Laboratory.

As compared with last year, the number of samples of feeding-cakes analysed remains about the same; that of ordinary artificial manures, such as superphosphate, &c., is considerably increased; while other items which contribute to the increased total are waters, manure-cakes, fish-manures, and nitrates of soda. The chief decrease is in the case of soils. The complete list is given in detail on page 337.

Linseed-cakes.—The use of hard-pressed American cakes, to which I drew attention in my last Annual Report, has, on account of the lower prices at which they are offered, very much increased. These cakes, though poor in oil, I have found almost universally to be made from very pure and clean seed, and in this respect are much more to be depended upon than those of English make. There has been a decided improvement in the purity of the latter kind during the year, due, I believe, in great measure to the attention drawn to this point in the Reports of the Chemical Committee of the Society. American linseed-cakes selling at 8*l.* to 8*l.* 10*s.* per ton seldom contain as much as 9 per cent. of oil, and frequently less than 8 per cent.; and despite the large use made of American cakes, there seems to be a good demand for high-class linseed-cakes. As instances, I append the following:—

ANALYSES OF HIGH CLASS PURE LINSEED-CAKES.

	No. 1.	No. 2.	No. 3.	No. 4.
Moisture	12·21	12·33	9·33	9·34
Oil	13·93	13·23	15·63	12·37
* Albuminous compounds	29·06	30·31	28·25	28·12
Mucilage, sugar, and digestible fibre ..	28·65	27·51	29·24	34·63
Woody fibre (cellulose)	9·40	11·53	9·97	7·30
Mineral matter (ash)	6·75	5·09	7·58	8·24
	100·00	100·00	100·00	100·00
* Containing nitrogen	4·65	4·85	4·52	4·50

No. 1 was bought in Hull at 9*l.* 12*s.* 6*d.* per ton; No. 2 of a local dealer in Sussex at 10*l.* per ton; No. 3 at 9*l.* per ton; and No. 4 at 8*l.* 12*s.* 6*d.* per ton. All four cakes were perfectly pure and in good condition.

Under the names of "Russian linseed-cakes" and "Polish linseed-cakes," cakes of very good quality have this year been sold at very cheap prices. These cakes, if not as a rule quite so pure as the best English makes, are often but slightly inferior.

ANALYSES OF RUSSIAN AND POLISH LINSEED-CAKES.

	No. 1. Russian.	No. 2. Russian.	No. 3. Russian.	No. 4. Polish.
Moisture	11·15	9·19	10·76	15·16
Oil	12·53	16·40	11·47	15·47
*Albuminous compounds	86·18	81·81	38·87	24·56
Mucilage, sugar, and digestible fibre ..	26·64	28·49	24·75	27·11
Woody fibre (cellulose)	8·40	8·40	10·63	9·37
Mineral matter (ash)	5·10	5·71	7·52	8·83
	100·00	100·00	100·00	100·00
* Containing nitrogen	5·79	5·09	5·58	3·93

No. 1 is a quite pure cake, and was bought at the very low price of 7*l.* 12*s.* 6*d.* per ton at the wharf in London. No. 2, also a pure cake, cost 9*l.* per ton at Gloucester, and is a cake of singular richness. Nos. 3 and 4, though hardly so pure, leave but little to complain of.

Cotton-cakes containing excess of Moisture.—My attention has been frequently called this year to the number of undecorticated cotton-cakes which have reached me, accompanied by complaints of injury they have done to stock. In many of these cases I have on examination found the cakes to have become mouldy, either externally only, or throughout the cake, or, as frequently happens, they are quite sound on the exterior and mouldy within. The cakes on being stirred up with water have given a decidedly acid reaction to test-paper, and in this state are not fit to be given to stock as food. Analysis has shown an excessive quantity of moisture to be present in these cases, which has naturally raised the question:—did the cake originally contain this amount of moisture, or has it arisen from the cake being stored in a damp place or otherwise improperly? When the sample has been sent for examination, only after it has been kept for some time it is impossible to settle the question; but in some cases I have been informed that a cake, though apparently sound, was found to be mouldy inside on the day after its delivery; and in others that every possible attention has been paid to the careful

and dry storage of the cake, allowing free access of air to the stack, &c., and that no harm could have arisen on that account. I have no doubt that in many cases an excessive amount of water occurs in many of the cotton-cakes sent out from the mills, and this is likely not only to spoil the cakes, but to do harm to stock. I append analyses of several samples which contained too large a quantity of moisture for keeping thoroughly well:—

	No. 1.	No. 2.	No. 3.	No. 4.
Moisture	15.44	14.69	13.73	15.56
Oil	1.86	3.57	4.77	6.40
*Albuminous compounds	29.38	20.12	24.50	23.06
Mucilage, &c.	28.17	33.25	29.86	26.90
Woody fibre	20.01	23.06	21.40	23.20
Mineral matter	5.14	5.31	5.74	4.88
	100.00	100.00	100.00	100.00
*Containing nitrogen	4.70	3.22	3.92	3.69

In reference to these, the sender of No. 1 complained that he had lost several cattle from splenic apoplexy; of No. 2, that some oxen after eating the cake were seized with violent purging, one dying and a second having to be slaughtered. On examination I found both cakes to be mouldy in the interior, but not appreciably on the exterior, and hence had probably escaped notice when given to the cattle. No. 3 also I found to be a mouldy cake, and not safe to use for feeding. No. 4 was at the time of analysis fresh and good, but the quantity of moisture it contained was excessive.

Rice-Meal.—This article has been largely used for feeding purposes, and is a useful and valuable food. Samples of very high quality have come under my notice, but to show the variations in quality I give the following analyses:—

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.
Moisture	8.70	9.65	11.15	7.58	9.89	9.19
Oil	12.17	9.83	7.66	12.43	8.20	12.63
*Albuminous compounds	11.81	12.12	11.43	12.83	9.93	11.56
Starch, &c.	50.55	56.52	58.28	50.21	57.21	54.55
Woody fibre	7.27	4.78	5.18	7.83	7.83	4.53
Mineral matter	9.50	7.15	6.35	9.62	6.94	7.54
	100.00	100.00	100.00	100.00	100.00	100.00
* Containing nitrogen	1.89	1.94	1.83	2.05	1.59	1.85

Rice-meal is a capital food to mix with a highly nitrogenous and concentrated substance such as decorticated cotton-cake, or with bean or pea-meal.

Cocoanut-Meal.—

ANALYSES of TWO SAMPLES of COCOA-NUT MEAL.

	No. 1.	No. 2.
Moisture	9·60	8·63
Oil	11·03	8·50
*Albuminous compounds	21·75	20·56
Mucilage, digestible fibre, &c.	41·14	48·23
Woody fibre	8·83	12·60
Mineral matter	7·65	6·48
	100·00	100·00
* Containing nitrogen	3·48	3·29

These two samples, it will be noticed, differ greatly in the percentage of oil they severally contain, and yet No. 2 was bought at 5*l.* 15*s.* per ton, the price of a good sample such as No. 1.

Maize Germ.—Under the name “Germ,” or more recently “Maize Germ” (though often incorrectly termed “Wheat Germ”), a new feeding substance of considerable value has come into notice. It is stated to be obtained by a new roller-system, instead of by using mill-stones. I have analysed several samples of it as follows:—

	No. 1.	No. 2.	No. 3.
Moisture	12·85	11·97	11·05
Oil	10·57	8·13	7·80
*Albuminous compounds	29·37	24·19	17·56
Digestible fibre, starch, &c.	40·79	48·99	58·43
Woody fibre	1·67	2·43	4·46
Mineral matter (ash)	4·75	4·29	·70
	100·00	100·00	100·00
* Containing nitrogen	4·70	3·87	2·81

This is a very suitable food for horses, and may be used also for milking-cows and fattening stock with advantage, if purchased at a reasonable price.

The low price of wheat has caused wheat-meal to be to some extent used for feeding. Similarly, depression in the sugar-

trade, and the consequent low price of sugar, has caused sugar and molasses to be occasionally employed as fattening agents, or rather for the purpose of rendering coarse straw-chaff, &c., more palatable. Linseed having also become cheaper, the crushed seed has been, in the absence of succulent food, used with advantage under some circumstances.

Superphosphates, Artificial Manures, &c.—As an instance of the varying value of manures, and the necessity of buying according to guaranteed analysis, I give the following case.

A member of the Society sent me for analysis four samples of manure, which I found to contain

	No. 2.	No. 3.	No. 4.	No. 1.
Water	16·95	16·45	14·35	20·50
*Organic matter	21·28	26·07	29·57	16·66
Monobasic phosphate of lime (Equal to tribasic phosphate of lime)	14·04 (21·74)	12·27 (19·21)	10·87 (17·21)	7·05 { Phosphate of lime.
Insoluble phosphates	8·07	10·79	6·80	5·16 { Oxide of iron and alumina.
Sulphate of lime, &c.	84·68	29·96	32·31	17·77 { Sulphate of lime, &c.
Insoluble siliceous matter ..	4·98	4·55	6·10	32·86
	100·00	100·00	100·00	100·00
* Containing nitrogen ..	·65	·83	1·20	1·01
Equal to ammonia ..	·79	1·01	1·45	1·22

The prices at which these were sold were:—

No. 1. 4*l.* 10*s.* per ton, my estimate after analysis being 1*l.* 16*s.* per ton.

No. 2. 5*l.* 5*s.* " " " 5*l.* 5*s.* 6*d.* "

No. 3. 5*l.* 5*s.* " " " 5*l.* 6*s.* "

No. 4. 7*l.* 10*s.* " " " 5*l.* 1*s.* "

Thus, while two were sold at reasonable prices, the other two were about 50*s.* each too dear.

Apple Juice.—The following is the composition of three samples of apple-juice preserved by a member of the Society as a non-alcoholic beverage:—

	No. 1.	No. 2.	No. 3.
Water	86·42	84·58	87·19
Alcohol	·05	3·55	·15
Organic matter	13·18	11·54	12·34
Saline mineral matter	·35	·83	·32
	100·00	100·00	100·00

The first sample contained the merest trace of alcohol, and when re-analysed nine months later, only showed .41 per cent. No. 2, made from sour fruit, on the other hand, contained a considerable quantity. No. 3 again had but very little.

Soft-soap.—For washing hops, soft-soap dissolved in a decoction of quassia, instead of ordinary water, was largely used in Kent this season. The following is the composition of two good samples of soft-soap:—

	No. 1.	No. 2.
Moisture	48.38	47.02
Fatty acids	42.04	42.30
Potash (K ₂ O)	9.17	9.24
Glycerine, saline matters, &c. .. .	.41	1.44
	100.00	100.00

African Lake Soil impregnated with Salt.—The water had been drained off from a lake in North Africa, and an endeavour had been made to cultivate the soil. Analysis of it gave:—

(Soil dried at 212° Fahr.)

Oxide of iron	3.69
Alumina	6.87
Sulphate of lime	10.61
Carbonate of lime	25.14
Magnesia	1.33
Potash	.98
Sulphate of soda	7.42
Chloride of sodium (common salt)	5.61
Phosphoric acid	.11
*Organic matter	3.23
Insoluble silicates and sand	35.01
	100.00

* Containing nitrogen	.06
Equal to ammonia	.07

This soil—a stiff clay-marl—is largely impregnated with common salt and sulphate of soda, and to such an extent that nothing could grow on it. The surface on exposure became encrusted with a saline deposit, and the probability is that the saline nature of the soil is not due merely to submersion by sea-water, but to saline deposits existing there, and which would not be removed by draining and washing by rain, so as to leave the soil fit for cultivation.

Waters.—Of the 102 waters submitted to me for examination, the greater number by far have been those which, if they could

not be distinctly called injurious to health, are very far removed from being waters which it would be advisable to use for drinking purposes. In the majority of cases effective filtration would render the waters fit for use. Supply through a Water Company supposed to possess efficient filtering-beds is not in all cases a guarantee of this being done, as the following analyses of a water from North Wales shows:—

	Grains per Gallon.
Total solid constituents, dried at 130° C.	10·08
Consisting chiefly of salts of lime, and including—	
Oxidisable organic matter	·92
Chloride of sodium	1·38
Nitric acid as nitrates	none
Actual (saline) ammonia	·007
Organic (albuminoid) ammonia	·017

The water was turbid, and contained suspended organic matter, and also living and moving organisms, and was quite unfit for drinking purposes.

Several cases have also occurred of cattle supposed to have died from drinking bad and stagnant water, the examination of the water leaving little doubt as to its being the cause of death.

Among the examinations for poisoning, four cases of lead poisoning have been sent; also one of a young horse killed through plucking the branches of yew-trees in a plantation.

The investigations I have made on the subjects of creosote for hop-poles, wood-fences, &c., and of ensilage, together with numerous analyses connected with the latter, form the matter of two special papers contributed by me to the 'Journal' of the Society.

The 'Journal' for 1884 contains the following papers by myself:—

1. Annual Report for 1883.
2. Quarterly Reports to the Chemical Committee.
3. Report on the Field and Feeding Experiments conducted at Woburn during the year 1883.
4. On the Quality of Creosote suitable for protecting Hop-poles, Wood-fences, &c., against Decay.
5. On the Chemistry of Ensilage.

I have from time to time visited the Experimental Fields at Crawley Mill Farm, Woburn, and have directed the experiments carried on there. In addition to those undertaken before, a set of experiments on Ensilage has been added to the number, and is now in progress.

For
 AUGUSTUS VOELCKER,
 JOHN AUGUSTUS VOELCKER.

Report on the Field and Feeding Experiments at Woburn. 337

List of Analyses made for Members of the Royal Agricultural Society of England from 1st December, 1883, to 30th November, 1884.

Feeding-cakes	458
Compound cakes	9
Feeding-meals	33
Corn, vegetable products, &c.	14
Superphosphates, dissolved bones, and compound manures	443
Guanos	46
Coprolites	10
Bones, bone-meal, &c.	110
Refuse manures	14
Manure-cakes	37
Sewage manures	2
Fish manures	26
Dried blood	4
Horns and hoofs	3
Wool-dust and shoddy	29
Nitrate of soda	98
Kainit and potash salts	32
Sulphate of ammonia	33
Soot	7
Lime, limestone, gypsum, marls, minerals, &c. ..	22
Soils	34
Waters	102
Milk, cheese, butter, bread	11
Articles of drink	2
Examinations for poison	8
Ensilage	21
Creosote	12
Miscellaneous	13
Total	1628

XIII.—*Report on the Field and Feeding Experiments at Woburn, conducted on behalf of the Royal Agricultural Society of England, during the year 1884.* By Dr. J. AUGUSTUS VOELCKER, B.A., B.Sc., F.C.S., Consulting Chemist to the Royal Agricultural Society.

EXPERIMENTS ON THE CONTINUOUS GROWTH OF WHEAT.

ON September 17th, 1883, a beginning was made by breaking up the land with the grubber to kill the weeds; it was ploughed on October 15th, and drag-harrowed on the 20th, being at the same time marked out with the drill. In this way all twitch was got out, and only one ploughing having been necessary, the stubble was kept at the bottom.

Nine pecks of Browick wheat to the acre, as in former years,

were dibbled in during October 22nd to 24th. The wheat began to show on the first days of November, and a week of heavy rain was succeeded by one of sharp frosts, which somewhat checked its growth. The mineral manures were sown broadcast on November 27th. On December 1st the wheat looked strong and healthy, and was a good plant.

Four bullocks were put under experiment on November 20th to make the dung required for plots 10 B and 11 B. To do this they were put up in the feeding-boxes for 24 days, November 20th to December 14th, during which time they consumed 2 cwts. 2 qrs. decorticated cotton-cake, 4 cwts. maize-meal, 30 cwts. sliced white turnips, and 5 cwts. wheat straw-chaff, and were supplied with 12 cwts. of wheat-straw as litter. Their weights at the commencement and end of the experiment were as follows :—

	Put up, Nov. 20.			Removed, Dec. 14.			Gain in Live- Weight in Twenty-four Days.		
	cwts.	qrs.	lbs.	cwts.	qrs.	lbs.	cwts.	qrs.	lbs.
Bullock No. 1 weighed	8	3	4	9	1	20	0	2	16
" No. 2 "	8	3	26	9	2	2	0	2	4
" No. 3 "	8	2	27	9	1	9	0	2	10
" No. 4 "	9	2	3	10	1	0	0	2	25
Total weight of 4 Bullocks ..	36	0	4	38	2	3	2	1	27

All the bullocks did well, the total gain being double that obtained under similar conditions in the previous year. They began feeding with 30 lbs. of roots per day and other food in proportion, gradually increasing to 40 lbs. of roots per day. Analyses of the decorticated cotton-cake and maize-meal gave their composition as follows :—

	Decorticated Cotton- cake.	Maize-meal.
Moisture	7·80	13·05
Oil	13·96	3·50
* Albuminous compounds	39·51	8·62
Digestible fibre, starch, &c.	28·66	71·32
Woody fibre	3·76	1·66
Mineral matter (ash)	6·31	1·85
	100·00	100·00
* Containing nitrogen	6·32	1·38

The dung was removed from the pits and covered over, being left until February 13th, 1884.

The wheat continued to grow well. On January 2nd, 1884, a few gaps made by birds and other causes were filled up by dibbling in fresh wheat. The mild autumn and winter suited the wheat, but about the middle of January it was attacked by the same white grub which did it so much damage last year. Unfortunately the weather became so wet as to prevent pressing and rolling the land being carried out. The insects happily did not seem to increase in number.

On February 13th the dung was weighed, the total being 30 cwts. 3 qrs. 24 lbs. To the half-plots 10 B and 11 B dung in quantity calculated to contain 100 lbs. and 200 lbs. of ammonia respectively per acre was applied on the same day. The weather continued to be mild. On February 20th, as there was a quantity of young grass coming up, hoeing the wheat was commenced. By March 15th the plots had been twice hoed, and looked very well. After three weeks of dry weather, by which time the wheat was healthy and strong again, and all the grass killed, the nitrogenous top-dressings of nitrate of soda and ammonia-salts were sown on March 26th by a broadcast manure-distributor, after being diluted with three times their bulk of dry sand.

An inspection of the wheat on April 9th showed that there was a good and even plant on all the plots. Those manured with minerals alone seemed rather lighter coloured than the unmanured plots. Where nitrate of soda had been applied only a fortnight previously, the crop showed itself plainly by its darker colour. The effect of the ammonia-salts was not so marked as that of nitrate of soda, though, as compared with the half-plots where they had been omitted and minerals alone used, there was a marked difference. Similarly, the dunged plots, 10B and 11B, stood out in favourable comparison with 10A and 11A, left undunged. Showery weather following suited the wheat, and then came a cold dry week. Another visit paid on the 30th of April showed the same features as had been first noticed, the effects of nitrate of soda and ammonia-salts being well marked, especially the former. The plots manured with minerals alone showed no better than the unmanured ones. About June 16th the wheat came in ear, and by the 21st was so all over the field. Heavy thunderstorms the second week of July knocked most of the heaviest corn down, and that which was storm-broken shortly began to mildew. However, by the first week of August it came on very well, and all was cut pretty nearly together on August 6th to 8th. Perfect harvesting

weather enabled the wheat to be carted on August 15th in good condition, and stacked. It was threshed in the field on October 21st to 24th, the straw being weighed at once, and the corn stored in the granary, where it was weighed on October 28th with the usual care. The results are given in Table I.

The yield has in every case been higher than that of either 1882 or 1883, the season having been a very favourable one. Speaking generally, the produce was very similar to that of 1881. The unmanured plots, 1 and 7, show a decided increase, the result in the case of plot 7 being the highest as yet obtained without manure, although eight successive corn crops have been grown. 200 lbs. of ammonia-salts alone proved decidedly better than 275 lbs. of nitrate of soda alone, giving also a greater weight per bushel and more straw. Where minerals alone were applied, as in former years, the produce was lower than that of the unmanured plots. As has been demonstrated in former years by these experiments, the use of either ammonia-salts or nitrate of soda in conjunction with mineral manures was productive of heavier crops than could be obtained by using either class of manure alone. 200 lbs. of ammonia-salts gave, with minerals, a rather better result than 275 lbs. nitrate of soda, also with minerals, the latter giving, however, a larger yield of straw. When double the amount (400 lbs.) of ammonia-salts was used with minerals, only 2 bushels more per acre were obtained than with the single quantity, but doubling the dose of nitrate of soda gave an increase of 8·3 bushels, minerals also being used. This latter proved to be the highest produce of wheat as yet obtained in these experiments; it did not exceed that from 400 lbs. of ammonia-salts and minerals by more than 2 bushels, but gave a very much larger yield of straw. These two last-mentioned results were got on plots 8B and 9B, which, it will be remembered, had been manured in 1883 with minerals alone, yielding then respectively 17·3 and 18·6 bushels only. The half-plots 8A and 9A, manured in 1883 with minerals and 400 lbs. ammonia-salts, and with minerals and 550 lbs. nitrate of soda, and then yielding 45·8 and 43·8 bushels respectively, upon the omission of the ammonia-salts and nitrate of soda in 1884, fell to 32·5 and 21·9 bushels. The fall when ammonia-salts were omitted was hardly as pronounced as in former years. At the same time it must be borne in mind that the unmanured plots gave this season a much increased produce, reaching 26·6 bushels in the case of plot 7. Where nitrate of soda was omitted (plot 9A), the fall was as marked as before. On the plots where dung had not been applied since 1881, the better season gave rather

TABLE I.—PRODUCE OF CONTINUOUS WHEAT. EIGHTH SEASON, 1884.

PLOTS.	MANURES PER ACRE.	PRODUCE PER ACRE.			
		Dressed Corn.			Straw, Chaff, &c.
		Weight.	Number of Bushels.	Weight per Bushel.	
		lbs.		lbs.	cwt. qrs. lbs.
1	Unmanured	1362	23·1	59·0	24 3 12
2	(200 lbs. ammonia-salts alone (applied in the spring)	2338	40·3	58·0	35 1 22
3	(275 lbs. nitrate of soda (applied in the spring)	1796	31·9	56·3	29 3 10
4	(200 lbs. sulphate of potash, 100 lbs. sulphate of soda, 100 lbs. sulphate of magnesia, 3½ cwt. superphosphate of lime	1278	21·6	59·0	19 3 10
5	(200 lbs. sulph. potash, 100 lbs. sulph. soda, 100 lbs. sulph. magnesia, 3½ cwt. superphosphate of lime, and 200 lbs. ammonia-salts (in spring)	2705	46·1	58·6	39 2 2
6	(200 lbs. sulph. potash, 100 lbs. sulph. soda, 100 lbs. sulph. magnesia, 3½ cwt. superphosphate of lime, and 275 lbs. nitrate of soda (in spring)	2582	42·7	59·2	41 2 20
7	Unmanured	1577	26·6	59·2	22 3 8
8A	(200 lbs. sulph. potash, 100 lbs. sulph. soda, 100 lbs. sulph. magnesia, 3½ cwt. superphosphate of lime	1942	32·5	59·7	27 2 0
8B	The same minerals as in 8A, and 400 lbs. ammonia-salts	2884	48·8	59·0	40 3 8
9A	(200 lbs. sulph. potash, 100 lbs. sulph. soda, 100 lbs. sulph. magnesia, 3½ cwt. superphosphate of lime	1257	21·9	57·3	19 3 16
9B	The same minerals as in 9A, and 550 lbs. nitrate of soda (in spring)	2956	51·0	57·9	53 1 16
10A	No manure (having received manure as 10B in each of the five seasons previous to 1882, but none in 1882)	1488	25·1	57·2	25 0 8
10B	Farmyard-manure, estimated to contain nitrogen = 100 lbs. ammonia, made from 672 lbs. decorticated cotton-cake, 1075 lbs. maize-meal, 8064 lbs. turnips, 1344 lbs. wheat-straw, as food; and 3174 lbs. wheat-straw as litter. Weight about 4 tons	1722	29·5	58·4	28 1 24
11A	No manure (having received manure as 11B in each of the five seasons previous to 1882, but none in 1882)	1382	24·2	57·0	24 2 16
11B	Farmyard-manure, estimated to contain nitrogen = 200 lbs. ammonia, made from 1344 lbs. decorticated cotton-cake, 2150 lbs. maize-meal, 16,128 lbs. turnips, 2688 lbs. wheat-straw chaff, as food; and 6348 lbs. wheat-straw as litter. Weight about 8 tons	2226	38·0	58·5	35 3 16

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higher results than in 1883, but hardly above the average of the unmanured plots, while where dung had been again applied, the produce, especially in the case of the heavier dressing, was much increased.

EXPERIMENTS ON THE CONTINUOUS GROWTH OF BARLEY.

The land was broken up with the grubber on September 18, 1883, and ploughed on October 24th.

Four bullocks, to make dung for plots 10B and 11B, were put under experiment on November 20th, and finished on December 14th. In this period they consumed—

					cwts.	qrs.	lbs.
Decorticated cotton-cake	..	..	..	..	2	2	0
Maize-meal	..	..	..	..	4	0	0
Sliced white turnips	..	..	..	..	30	0	0
Wheat-straw chaff	..	..	..	..	5	0	0

and had besides 12 cwt. of wheat-straw chaff as litter.

The weights at the beginning and end of the experiment were:—

	Put up, Nov. 20.	Removed, Dec. 14.	Gain in Live- weight in Twenty-four Days.
	cwts. qrs. lbs.	cwts. qrs. lbs.	cwts. qrs. lbs.
Bullock No. 1 weighed	9 1 16	9 2 2	0 0 14
" No. 2 "	8 3 8	9 0 27	0 1 19
" No. 3 "	9 0 10	9 2 1	0 1 19
" No. 4 "	9 0 11	9 2 16	0 2 5
Total weight of 4 Bullocks ..	36 1 17	37 3 18	1 2 1

These bullocks, with the exception of No. 4, did not increase as much or so uniformly as the four, similarly fed, which made the dung for the permanent wheat.

The food given and the proportions were the same as in the latter case, already described.

The dung was removed from the pits on December 14th, and covered over until February 13th, 1884, when it was weighed, the total being 26 cwts. 3 qrs. 1 lb. It was applied that day to the half-plots 10B and 11B in quantities estimated to contain 100 lbs. and 200 lbs. of ammonia respectively per acre.

The mineral manures had been previously sown on January 16th. On March 19th the land was scuffed, rolled, and drag-harrowed, and the seed, "Oakshott's Golden Melon," drilled in on the 20th at the rate of 9 pecks per acre. The first week in April the barley began to appear, and on the 11th the nitro-

genous top-dressings of nitrate of soda and ammonia-salts were sown in good weather. The barley came up well, and on the 30th inst. there was a good and healthy plant on all the plots. Here and there wire-worms were picked out. The nitrogenous manures, having been sown much later than on the wheat, did not at this date show any effect, April having been very dry. On May 14-16 the land was hoed. About June 24th the barley came into ear, but the heavy rain threw down some of it, plots 8B and 9B especially suffering. My notes taken on July 17th were as follows:—

Plot 1 (unmanured). Healthy, but rather thin.

Plot 2 (ammonia-salts alone). Barley stands up well, not quite as good as No. 3, which has, however, gone down a good deal in places.

Plot 4 (minerals only). Lighter coloured than No. 1, and not quite so thick.

Plot 5 (ammonia-salts and minerals). Stands up well. Best plot of those on which the barley has not gone down.

Plot 6 (nitrate of soda and minerals). Heavy crop, but beaten down.

Plot 7 (unmanured). Somewhat down.

Plot 8A (minerals only). Like unmanured.

Plot 8B (ammonia-salts and minerals). Barley down.

Plot 9A (minerals only). Not better than unmanured.

Plot 9B (nitrate of soda and minerals). A heavy crop, but beaten down flat on the ground.

Plot 10B and 11B (farmyard dung). The dung shows plainly as compared with 10A and 11A.

As in the case of the wheat the fine weather at the close made the barley ripen very well and quickly, and it was cut August 6th and 7th, carted on the 15th, and stacked. It was threshed on the field on October 22nd, and the straw weighed, the corn being stored and finally weighed on October 28th.

The results are given in Table II., p. 344.

The unmanured plots gave on an average higher results than in 1882 and 1883, and about the same as in 1881. 200 lbs. of ammonia-salts and 275 lbs. of nitrate of soda gave almost identical results as to corn, and a great increase above the unmanured plots. The nitrate gave a rather large yield of straw. Minerals alone did not do better than where no manure was applied. The addition of minerals to 200 lbs. of ammonia-salts did not increase the produce, but minerals added to 275 lbs. of nitrate of soda caused a rise from 51·6 bushels to 57·8 bushels, and gave much more straw than was obtained by the ammonia-salts and minerals. Minerals with a double quantity (400 lbs.) of ammonia-salts gave 59·3 bushels as against 51·9 bushels with

TABLE II.—PRODUCE OF CONTINUOUS BARLEY. EIGHTH SEASON, 1884.

PLOTS.	MANURES PER ACRE.	PRODUCE PER ACRE.			
		Dressed Corn.			Straw, Chaff, &c.
		Weight.	Number of Bushels.	Weight per Bushel.	
		lbs.		lbs.	cwt. qrs. lbs.
1	Unmanured	1749	82·3	54·1	16 1 16
2	200 lbs. ammonia-salts, alone	2808	51·2	54·8	26 1 2
3	275 lbs. nitrate of soda, alone	2806	51·6	54·3	28 2 12
4	200 lbs. sulphate of potash, 100 lbs. sulph. of soda, 100 lbs. sulph. magnesia, 3½ cwt. superphosphate of lime	1717	32·1	53·5	16 1 26
5	200 lbs. sulph. of potash, 100 lbs. sulph. of soda, 100 lbs. sulph. of magnesia, 3½ cwt. superphosphate of lime, and 200 lbs. ammonia-salts	2981	51·9	57·4	27 2 24
6	200 lbs. sulph. of potash, 100 lbs. sulph. of soda, 100 lbs. sulphate of magnesia, 3½ cwt. of superphosphate of lime, and 275 lbs. nitrate of soda	3178	57·8	55·0	37 0 8
7	Unmanured	1756	33·3	52·7	18 3 2
8A	200 lbs. sulph. of potash, 100 lbs. sulph. of soda, 100 lbs. sulph. of magnesia, 3½ cwt. of superphosphate of lime ..	2616	46·4	56·3	26 1 8
8B	The same minerals as in 8A, and 400 lbs. ammonia-salts	3324	59·3	56·0	39 3 0
9A	200 lbs. sulph. of potash, 100 lbs. sulph. of soda, 100 lbs. sulph. of magnesia, 3½ cwt. of superphosphate of lime	2082	37·2	55·9	19 2 24
9B	The same minerals as in 9A, and 550 lbs. of nitrate of soda	2978	55·4	53·7	47 3 16
10A	No manure (having received manure as 10B in each of the five seasons previous to 1882, but none in 1882)..	2346	42·5	55·1	28 2 0
10B	Farmyard-manure, estimated to contain nitrogen = 100 lbs. of ammonia, made from 672 lbs. decorticated cotton-cake, 1075 lbs. maize-meal, 8064 lbs. turnips, 1344 lbs. wheat-straw chaff, as food; and 3174 lbs. wheat-straw as litter. Weight about 4 tons	2318	41·9	55·3	20 1 8
11A	No manure (having received manure as 11B in each of the five seasons previous to 1882, but none in 1882)..	2590	46·6	55·5	24 2 20
11B	Farmyard-manure, estimated to contain nitrogen = 200 lbs. ammonia, made from 1344 lbs. decorticated cotton-cake, 2150 lbs. maize-meal, 16,128 lbs. turnips, 2688 lbs. wheat-straw chaff, as food; and 6348 lbs. wheat-straw as litter. Weight about 8 tons ..	3204	57·1	56·1	33 0 16

minerals and 200 lbs. of ammonia-salts, but doubling the quantity of nitrate of soda gave 55·4 bushels only as against 57·8 bushels with minerals and the single quantity (275 lbs.). The nitrate of soda, however, gave 8 cwts. of straw per acre more than the ammonia-salts.

The results, 59·3 bushels and 55·4 bushels, were obtained on plots 8B and 9B, from which in 1883 all nitrogenous manures had been omitted, then giving 35·2 and 35·9 bushels respectively, so that the effects of the ammonia-salts and nitrate of soda were very marked. On now withholding nitrogenous manures from plots 8A and 9A which in 1883 had produced respectively 62·5 and 60·9 bushels, the yield fell to 46·4 and 37·2 bushels. As in the case of the wheat, the fall when ammonia-salts were withheld was hardly so pronounced, but very clear when no nitrate of soda was given. The dung applied in 1881 seemed still to have some effect on the barley crop, and 4 tons put on in 1884 gave no increase, but where 8 tons were applied in 1884 the produce was largely augmented.

THE EXPERIMENTS IN ROTATION.

Rotation No. 1.—Four acres. 1877, seeds; 1878, wheat; 1879, mangolds; 1880, barley; 1881, seeds; 1882, wheat; 1883, swedes.

Barley, 1884.—The swedes grown in 1883 were fed off by sheep which were put on November 3rd, 1883, and finished on March 26th, 1884.

The previous swede crop of 1883 had been manured per acre as follows:—

PLOT 1.—With dung, made from 1350 lbs. straw as litter; 5000 lbs. mangolds; 1250 lbs. wheat-straw chaff, and 1000 lbs. decorticated cotton-cake.

PLOT 2.—With dung, made from 1350 lbs. straw as litter; 5000 lbs. mangolds; 1250 lbs. wheat-straw chaff; and 1000 lbs. of maize-meal.

PLOT 3.—With dung, made from 1350 lbs. straw as litter; 5000 lbs. mangolds; 1250 lbs. wheat-straw chaff; and artificial manure, containing two-thirds as much nitrogen, and the other constituents, of the manure from 1000 lbs. decorticated cotton-cake; namely, 248 lbs. nitrate of soda, 100 lbs. of bone-ash (made into superphosphate), 62½ lbs. sulphate of potash, and 65 lbs. sulphate of magnesia.

PLOT 4.—With dung, made from 1350 lbs. straw as litter; 5000 lbs. mangolds; 1250 lbs. wheat-straw chaff; and artificial manure, containing as much nitrogen, and other constituents, as the manure from 1000 lbs. maize-meal; namely, 80 lbs. nitrate of soda, 16½ lbs. bone-ash (made into superphosphate), 7 lbs. sulphate of potash, and 11 lbs. sulphate of magnesia.

On March 27th the land was ploughed up and the barley drilled in on March 31st, 8 pecks per acre of Oakshott's Golden Melon being used. The barley came up well and uniformly. To plots 1, 2, and 4 no manure was used further than had been applied to the previous swede crop, but to plot 3 the remaining one-third of the nitrogen, equivalent to that in the manure from 1000 lbs. of decorticated cotton-cake, was applied in the form of a top-dressing of nitrate of soda on April 25th. About March 7th a great many wire-worms appeared and gave considerable trouble; a great number of them were destroyed. The land was hoed on May 12th and 13th. About June 26th the barley came into ear, showing a good even crop.

The inspection of July 17th showed:—

Plot 1 (cotton-cake plot). Barley a good deal down.

Plot 2 (maize-meal plot). Barley standing up well.

Plot 3 (artificials equivalent to cotton-cake dung). Barley more beaten down than on plot 4.

Plot 4 (artificials equivalent to maize-meal dung). A heavy crop, a little down, but not as much as on plot 3.

On August 18th the barley was cut, and carted the following day, the weather being all that could be desired. The produce was threshed in the field on October 23rd and 24th, the straw weighed at once, and after storing of the grain the latter was winnowed, measured, and weighed on October 29th. The results are given in Table III., p. 347. The yield was not so heavy as the exceptional one of 1883, but higher than in other years. The highest yield was obtained from plot 3, manured with artificials equivalent to the decorticated cotton-cake dung, but there was only a small difference between plots 1, 2, and 3. Plot 4 gave the lowest result of all. Plot 3 had in 1883 given the best result with the swede crop of this rotation, and with the swede crop, similarly treated, of 1882 (rotation 4).

Rotation No. 2.—Four acres. 1877, mangolds; 1878, barley; 1879, seeds; 1880, wheat; 1881, mangolds; 1882, barley; 1883, seeds.

Wheat, 1884.—The seeds, Dutch white clover, sown among the barley crop of 1882, were fed off between July and October 1883 by sheep, which consumed, on plot 1, 672 lbs. of decorticated cotton-cake as additional food, on plot 2, 728 lbs. of maize-meal, but on plots 3 and 4 no additional food. The land was ploughed up on October 18th, 1883, and Browick wheat at the rate of 8 pecks per acre drilled in on November 27th. The wheat came up well, and on January 16th, 1884, mineral manures were sown on plots 3 and 4, and the nitrogenous top-dressings on March 27th, the two kinds of manure together making up in arti-

TABLE III.—PRODUCE OF BARLEY (ROTATION No. 1), IN 1884, AFTER SWEDES FED ON THE LAND.

Plots of One Acre.		DRESSED CORN.								Straw, Chaff, &c.
		Head-Corn.				Tail-Corn.				
		Weight.	Bushels.	Weight per Bushel.	Weight.	Bushels.	Weight per Bushel.			
1	Without artificials (cotton-cake plot) ..	cwts. qrs. lbs. 24 0 22	48·8	lbs. 55·5	cwts. qrs. lbs. 0 2 13	1·6	lbs. 42·5	tons. cwts. qrs. lbs. 1 8 0 13		
2	Without artificials (maize plot)	24 0 3½	48·1	55·9	0 3 6	2·0	44·2	1 7 3 26		
3	{ With artificial manure, containing one- third as much nitrogen as the manure from 1000 lbs. decorticated cotton-cake, namely, 12½ lbs. nitrate of soda }	24 3 20	50·9	54·8	1 0 21	2·9	45·8	1 16 1 16		
4	Without artificial manure	22 2 15	46·1	54·9	0 2 14	1·4	49·5	1 8 0 19		

ficials the equivalent of the dung produced from the consumption of 672 lbs. of decorticated cotton-cake in the case of plot 3, and of 728 lbs. of maize-meal in that of plot 4. To plots 1 and 2 no more manure was applied at all. The land had to be thoroughly twitched and hoed early in April. No perceptible difference was observed on any of the plots, as all looked very strong. On April 30th the acre manured with the heavy dose of nitrate of soda (plot 3) was the most luxuriant, next to it coming the cotton-cake plot (plot 1). The wheat continued to show a splendid crop, but was much beaten down in July on all the four plots. The wheat was cut on August 8th, carted on August 14th and stacked. Threshing was done in the field on October 22nd, the straw being then weighed, and the corn on the 29th.

The results are given in Table IV., p. 349.

Practically the same result was obtained from maize-meal, whether applied as dung or as artificial manure, the yields being higher than those from decorticated cotton-cake in either form. The lowest yield came from plot 3, and it is worthy of notice that the barley crop of 1882, in this same rotation, was poorest on plot 3, and also that the wheat crops of 1882 (Rotation 1) and 1883 (Rotation 3), which had undergone similar treatment to the present wheat crop, were poorest on this same plot.

Rotation No. 3.—Four acres. 1878, seeds; 1879, wheat; 1880, mangolds; 1881, barley; 1882, seeds; 1883, wheat.

Swedes, 1884.—The land upon which wheat had been grown in 1883 was ploughed up on Nov. 19th, 1883.

Dung to be applied to the swedes was made by 8 bullocks, which began the experiment on Dec. 18th, and finished, Nos. 3, 4, 5, and 6 on Feb. 15th, and Nos. 1, 2, 7, and 8 on Feb. 19th.

The food consumed by the bullocks was as follows :—

For Plot 1. (2 bullocks.) 923 lbs. of decorticated cotton-cake, 5000 lbs. of mangolds, 1250 lbs. of wheat-straw chaff.

For Plot 2. (2 bullocks.) 1000 lbs. of maize-meal, 5000 lbs. of mangolds, 1250 lbs. of wheat-straw chaff.

For Plot 3. (2 bullocks.) 5000 lbs. of mangolds, 1250 lbs. of wheat-straw chaff.

For Plot 4. (2 bullocks.) 5000 lbs. of mangolds, 1250 lbs. of wheat-straw chaff.

Each set of 2 bullocks received alike 1880 lbs. of wheat-straw chaff in addition, as litter.

TABLE IV.—PRODUCE OF WHEAT (ROTATION No. 2), IN 1884, AFTER SEEDS FED ON THE LAND IN 1883.

Plots of One Acre.		DRESSED CORN.							Straw, Chaff, &c.
		Head-Wheat.			Tail-Wheat.				
		Weight.	Bushels.	Weight per Bushel.	Weight.	Bushels.	Weight per Bushel.		
1	{ Seeds fed off by sheep, which consumed } { 672 lbs. of decorticated cotton-cake .. }	cwts. qrs. lbs. 25 2 24	48.0	lbs. 59.9	cwts. qrs. lbs. 1 1 7	3.5	lbs. 41.0	tons. cwts. qrs. lbs. 2 19 3 7	
2	{ Seeds fed off by sheep, which consumed } { 728 lbs. of maize-meal }	27 0 15	49.9	60.9	0 3 10	2.4	39.0	2 18 2 24	
3	{ Seeds fed off by sheep without cake or corn, top-dressed in spring with artificial manures, containing as much nitrogen, potash, phosphoric acid, &c., as 672 lbs. of decorticated cotton-cake }	24 2 2	45.0	61.0	0: 3 18	2.4	40.1	2 12 2 15	
4	{ Fed off by sheep without cake or corn, top- dressed in spring with artificial manures, containing as much fertilising matter as the dung from 728 lbs. of maize-meal .. }	27 1 3	50.0	61.1	0 3 8½	2.2	41.5	2 14 2 9	

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The weights of the bullocks at the commencement and end of the experiments were:—

	When put in, Dec. 18th.	When removed, Nos. 3, 4, 5, 6, Feb. 16th. Nos. 1, 2, 7, 8, Feb. 19th.	Increase in Live-weight.
	cwt. qrs. lbs.	cwt. qrs. lbs.	cwt. qrs. lbs.
For Plot 1.—2 Bullocks, 1 and 2, receiving decorticated cotton-cake as additional food	19 0 6	20 3 18	1 3 12
For Plot 2.—2 Bullocks, 7 and 8, receiving maize-meal as additional food	18 2 15	20 2 19	2 0 4
For Plot 3.—2 Bullocks, 3 and 4, fed without cake or corn	18 0 0	17 3 12	loss 0 16
For Plot 4.—2 Bullocks, 5 and 6, fed without cake or corn	18 1 25	17 3 17	loss 2 8

In this experiment the value of the additional foods was clearly seen. The dung was removed from the pits and kept under cover until May 19th, when it was weighed, carted on the field, and ploughed in on the 20th. The mineral manures were sown on plots 3 and 4 on May 23rd; and the seed, 3 lbs. to the acre of Gibbs's selected purple-top swede, was drilled in on May 24th. The plants began to appear on May 30th. The land was horse-hoed on June 18th, and the plants began to be set out on June 27th. As the roots grew, those on plots 3 and 4 (manured with superphosphate) showed decidedly in advance of the others. Towards the end of June the great heat shrivelled up a number of the smaller plants, and rain was much needed for them.

The storms of July benefited the roots much, and they grew very fast and well. On July 24th nitrate of soda was sown by hand round the roots on plots 3 and 4. Drought followed towards the close of September, and the swedes suffered much, being badly mildewed on all the plots. On November 24th the roots were taken up, topped, tailed, and weighed.

The results are given in Table V., p. 351.

It will be seen that on the plots receiving superphosphate, the produce was considerably higher, both in roots and leaves, than on those having none. The highest yield was on plot 3, which, under similar treatment, had given the heaviest crop of swedes both in 1882 (Rotation 4) and 1883 (Rotation 1); in both cases, as now, the superiority of plots 3 and 4 above plots 1 and 2

being marked. Plot 1 (decorticated cotton-cake dung) was somewhat better than plot 2 (maize-meal dung).

TABLE V.—PRODUCE of SWEDES, 1884 (ROTATION No. 3),
after WHEAT.

Plots of One Acre.		PRODUCE PER ACRE.			
		Roots.		Leaves.	
		Tons.	cwt. qrs. lbs.	Tons.	cwt. qrs. lbs.
1	{ With dung, made from 1880 lbs. straw as litter; 5000 lbs. mangolds; 1250 lbs. wheat-straw chaff, and 1000 lbs. decorticated cotton-cake }	14	9 3 16	1	18 0 27
2	{ With dung, made from 1880 lbs. straw as litter; 5000 lbs. mangolds; 1250 lbs. wheat-straw chaff, and 1000 lbs. of maize-meal }	13	13 0 6	1	16 1 9
3	{ With dung, made from 1880 lbs. straw as litter; 5000 lbs. mangolds; 1250 lbs. wheat-straw chaff; and artificial manure, containing two-thirds as much nitrogen, and the other constituents, of the manure from 1000 lbs. decorticated cotton-cake; namely, 248 lbs. nitrate of soda, 100 lbs. of bone-ash (made into superphosphate), 62½ lbs. sulphate of potash and 65 lbs. sulphate of magnesia }	16	10 1 0	2	17 3 2
4	{ With dung, made from 1880 lbs. straw as litter; 5000 lbs. mangolds; 1250 lbs. wheat-straw chaff; and artificial manure, containing as much nitrogen, and other constituents, as the manure from 1000 lbs. maize-meal; namely, 80 lbs. nitrate of soda, 16½ lbs. bone-ash (made into superphosphate), 7 lbs. sulphate of potash, and 11 lbs. sulphate of magnesia }	15	14 2 9	2	16 3 10

Rotation No. 4.—Four acres. 1878, mangolds; 1879, barley; 1880, seeds; 1881, wheat; 1882, swedes; 1883, barley.

Seeds, 1884.—The seeds, white Dutch clover, had been sown among the barley of 1883 on May 18th, 1883. A good plant was obtained, and forty sheep, ten on each acre plot, were put on for the first time on May 7th, 1884, and finished on June 9th. The ten on plot 1 received per head per day about $\frac{1}{2}$ lb. of decorticated cotton-cake additional, those on plot 2 about $\frac{1}{2}$ lb. of maize-meal, the other two lots no additional food. The results after going over for the first time were :—

Plots.		When put on, May 7.	When taken off, June 9.			Increase in Live-weight.
		cwts. qrs. lbs.	cwts. qrs. lbs.	lbs.		
1	{ Fed-off by 10 sheep, each sheep receiving about $\frac{1}{2}$ lb. decorticated cotton-cake per day; 10 sheep on the land 32 days .. }	11 1 2 $\frac{1}{2}$	14 0 19	324 $\frac{1}{2}$		
2	{ Fed-off by 10 sheep, each sheep receiving about $\frac{1}{2}$ lb. of maize- meal per day; 10 sheep on the land 32 days }	11 1 2 $\frac{1}{2}$	13 3 27	304 $\frac{1}{2}$		
3	{ Fed-off by 10 sheep, without other food; 10 sheep on the land 32 days }	11 0 11 $\frac{1}{2}$	14 0 1	325 $\frac{1}{2}$		
4	{ Fed-off by 10 sheep, without other food; 10 sheep on the land 32 days }	11 0 19 $\frac{1}{2}$	14 2 0 $\frac{1}{2}$	372 $\frac{1}{2}$		

The sheep, it will be seen, did extremely well. They began on June 9th to feed off for the second time and finished on July 14th, when the weights were:—

Plots.		When put on, May 7.	When taken off, July 14.			Increase in Live-weight.
		cwts. qrs. lbs.	cwts. qrs. lbs.	lbs.		
1	{ Fed-off by 10 sheep, eating about $\frac{1}{2}$ lb. of decorticated cotton-cake per sheep per day; on land 67 days }	11 1 2 $\frac{1}{2}$	14 3 16	405 $\frac{1}{2}$		
2	{ Fed-off by 10 sheep, eating about $\frac{1}{2}$ lb. of maize-meal per day; on land 67 days }	11 1 2 $\frac{1}{2}$	14 1 21 $\frac{1}{2}$	355 $\frac{1}{2}$		
3	{ Fed-off by 10 sheep, without other food; on land 67 days }	11 0 11 $\frac{1}{2}$	14 1 22 $\frac{1}{2}$	374 $\frac{1}{2}$		
4	{ Fed-off by 10 sheep, without other food; on land 67 days }	11 0 19 $\frac{1}{2}$	14 2 10	382 $\frac{1}{2}$		

This increase was not so good as that obtained on first going over the clover. A fresh lot of forty sheep was put on the clover on August 12th to go over it for the third time. The keep on plots 3 and 4 began to get sour, and so the sheep were run over it quickly. They finished it on September 2nd, and were then weighed. Those on plots 1 and 2 had not yet finished their allowance of cake and corn, but on September 8th pen 1 was ready, and pen 2 on the following day, the total

quantities of 672 lbs. decorticated cotton-cake and 728 lbs. maize-meal having been respectively consumed. The weights were as follows :—

Plots.		When put on, Aug. 12.	When taken off, Sept. 2, 8, and 9.	Increase in Live-weight.
		cwts. qrs. lbs.	cwts. qrs. lbs.	lbs.
1	{ 10 sheep, eating decorticated cotton-cake; on land 27 days }	11 1 20	12 1 19½	111½
2	{ 10 sheep, eating maize-meal; on land 28 days }	11 1 18½	11 3 23½	61½
3	{ 10 sheep, without additional food; on land 21 days }	11 1 18½	11 3 11	48½
4	{ 10 sheep, without additional food; on land 21 days }	11 1 18½	11 3 18½	51

The following table gives the summary of the whole experiment :—

Plots.		Increase in Live- weight. lbs.
1.	{ Fed-off by 10 sheep, with 672 lbs. decorticated cotton-cake; on land 94 days }	517
2.	{ Fed-off by 10 sheep, with 728 lbs. of maize-meal; on land 95 days }	416½
3.	{ Fed-off by 10 sheep, without other food; on land 88 days }	423½
4.	{ Fed-off by 10 sheep, without other food; on land 88 days }	433½

The sheep receiving decorticated cotton-cake as additional food increased, it will be seen, very much in weight, gaining 110 lbs. per head more than those fed on maize-meal. There was but little difference between the three sets, on plots 2, 3, and 4.

EXPERIMENTS ON SWEDES IN WARREN FIELD (STRONG LAND).

The following course had been followed:—1880, swedes; 1881, barley; 1882, seeds; 1883, oats. Manure in various phosphatic forms had been applied only to the swede crop in 1880.

Upon now commencing a new rotation, it was considered desirable to apply to the swedes similar manures to those used in 1880, and to further divide each ½ acre plot, using the same kind of fertiliser on the two halves, but in variable quantities. As before, each experiment was in duplicate, the plots being now ½ acre each, divided into two sections.

The system of manuring adopted is given in Table VI., pp. 354 and 355.

TABLE VI.—PRODUCE OF SWEDES IN WARREN

Plots. Section A.	Manure used and Cost per Acre.	Roots (topped and talled) per Acre.				Leaves per Acre.			
		Tons. cwt. qrs. lbs.				Tons. cwt. qrs. lbs.			
1. 1st half..	{ 3 cwt. ground coprolites; cost 12s. }	15	7	3	20	2	6	2	8
2nd half	{ 6 cwt. ground coprolites; cost 24s. }	15	4	2	8	2	10	0	0
2. 1st half..	{ 3 cwt. dissolved copro- lites; cost 12s. }	8	19	1	12	2	14	1	20
2nd half	{ 6 cwt. dissolved copro- lites; cost 24s. }	15	4	0	8	2	8	0	0
3. 1st half..	{ 3 cwt. Redonda phos- phate; cost 10s. 6d. .. }	15	8	1	20	2	8	2	24
2nd half	{ 6 cwt. Redonda phos- phate; cost 21s. }	11	6	0	16	2	8	2	0
4. 1st half..	{ 3 cwt. dissolved bones; cost 19s. 6d. }	13	10	2	8	2	11	0	8
2nd half	{ 6 cwt. dissolved bones; cost 39s. }	12	18	0	16	2	12	3	8
5. 1st half..	{ 2 cwt. dissolved copro- lites; cost 8s. }	12	17	2	0	2	5	1	4
2nd half	{ 4 cwt. dissolved copro- lites; cost 16s. }	14	14	0	24	2	8	3	20
6. 1st half..	No manure	5	5	1	4	1	15	2	0
2nd half	No manure	6	3	2	24	1	16	2	0
7. 1st half..	{ 3 cwt. bone-meal; cost 22s. 6d. }	11	17	0	8	2	13	2	0
2nd half	{ 6 cwt. bone-meal; cost 45s. }	13	11	0	8	2	14	2	24
8. 1st half..	10 tons dung; cost 50s.	15	1	3	20	2	14	1	12
2nd half	20 tons dung; cost 100s.	17	10	1	20	2	19	3	20
9. 1st half..	{ 10 tons dung and 3 cwt. dissolved coprolites; cost 62s. }	16	7	3	20	2	12	0	24
2nd half	{ 10 tons dung and 6 cwt. dissolved coprolites; cost 74s. }	16	6	2	8	2	14	2	16
10. 1st half..	{ 10 tons dung and 3 cwt. ground coprolites; cost 62s. }	15	15	2	24	2	15	1	16
2nd half	{ 10 tons dung and 6 cwt. ground coprolites; cost 74s. }	16	4	3	12	2	18	0	24
11. 1st half..	{ 2 cwt. dissolved copro- lites; cost 8s. }	9	15	1	12	3	3	2	24
2nd half	{ 4 cwt. dissolved copro- lites; cost 16s. }	12	2	3	12	3	6	3	20
12. 1st half..	{ 2 cwt. dissolved copro- lites and 1 cwt. nitrate of soda; cost 18s. .. }	8	12	0	16	3	2	0	24
2nd half	{ 4 cwt. dissolved copro- lites and 2 cwt. nitrate of soda; cost 36s. .. }	13	7	3	20	3	16	3	4

FIELD in 1884. Plots $\frac{1}{2}$ Acre each.

Flora. Section B.		Roots (topped and talled) per Acre.				Leaves per Acre.				Average of Duplicates. Roots per Acre.			
		Tons.	cwt.	qrs.	lbs.	Tons.	cwt.	qrs.	lbs.	Tons.	cwt.	qrs.	lbs.
1.	1st half	9	1	0	8	2	9	0	0	12	4	2	0
	2nd half	10	14	3	12	2	6	3	12	12	19	2	24
2.	1st half	14	6	1	12	3	13	0	24	11	12	3	12
	2nd half	12	2	2	8	2	18	0	0	13	13	1	8
3.	1st half	13	7	3	20	3	15	1	20	14	8	0	20
	2nd half	13	17	3	12	4	3	0	16	12	12	0	0
4.	1st half	14	9	1	12	4	0	1	4	13	19	3	24
	2nd half	14	2	0	24	3	5	0	24	13	10	0	20
5.	1st half	13	6	3	12	4	1	3	4	12	12	0	20
	2nd half	13	12	0	20	3	12	2	24	14	3	0	22
6.	1st half	8	16	1	4	4	1	0	16	7	0	3	4
	2nd half	8	4	0	24	3	10	1	4	7	3	3	24
7.	1st half	12	1	3	12	2	4	2	0	11	19	1	24
	2nd half	12	11	0	8	2	5	2	16	13	1	0	8
8.	1st half	14	3	1	4	2	11	0	24	14	12	2	12
	2nd half	16	3	0	24	2	9	0	0	16	16	3	8
9.	1st half	14	0	1	12	2	5	1	12	15	4	0	16
	2nd half	15	6	3	12	2	4	2	0	15	16	2	24
10.	1st half	15	0	0	8	2	7	0	16	15	7	3	16
	2nd half	15	9	0	0	2	6	0	16	15	16	3	20
11.	1st half	12	8	0	8	3	4	2	8	11	1	2	24
	2nd half	13	10	1	4	2	15	0	24	12	16	2	8
12.	1st half	9	10	1	20	2	4	2	0	9	1	1	4
	2nd half	10	13	0	24	2	14	2	16	12	0	2	8

The land was ploughed on April 22nd, scuffled on May 9th, and ploughed again on May 26th. The dung was applied on June 3rd to plots 8, 9, and 10, and the different minerals to the other plots on June 3rd and 4th. The seed, 3 lbs. of Gibbs's selected purple-top swede per acre, was drilled in on June 4th and 5th. The swedes came up well, and singling them was begun on June 30th. About this time the fly, however, touched them, and rain was much needed, so that the storms of July benefited the crop much. On July 21st the land was horse-hoed, and again on August 2nd. Nitrate of soda was put on plot 12 on July 24th. About the middle of August the turnip-grub made its appearance, and did great damage to the crop. To this cause are due in great measure the differences between the duplicate plots. On October 29th the following notes were taken:—

Plot 4A. Big roots, but much scattered.

Plot 6 (no manure). Fly very marked; a failure.

Plot 9A. Roots very necky.

Plot 8 (farmyard manure). Fair crop.

Plot 11A. Seems a pretty good crop.

Plot 12A. Patches eaten off.

Plot 12B. Fly in parts.

The roots were pulled, carted, and weighed between November 10th and 15th.

The results are given in Table VI., pp. 354 and 355.

These results, owing to the damage done to the crop by fly, have unfortunately been rendered in great measure not available for comparison. A few points are, however, worthy of notice. The plots which suffered by far the most were the unmanured ones 6A and 6B. The best results on the whole were obtained from farmyard manure, the double dose of 20 tons increasing the produce 2 tons per acre. The addition of either ground or dissolved coprolites to 10 tons of dung increased the produce somewhat. As a rule doubling the quantity of manure per acre did not tell largely.

EXPERIMENTS ON WHEAT IN LANSOME FIELD.

These experiments on the lighter land of Lansome field with different kinds of phosphatic fertilisers were similar to those conducted in Warren field. The rotation was: 1881, swedes; 1882, barley; 1883, peas; 1884, wheat. The manures given in Table VII. were used for the swedes in 1881, the swedes being fed off on the land by sheep, with the addition of an equal quantity of cake and corn on each plot, at the rate of 4 cwts. of barley-meal and 2 cwts. of decorticated cotton-cake per

acre. The land was ploughed on September 21st, 1883, drag-harrowed on October 13th before the drill, and harrowed after it—the seed (Browick wheat, 8 pecks to the acre) being drilled in on the same day. By November 1st it was well up. The land was hoed on March 27th and following days, and the wheat continued growing well. On August 6th it was cut, and carted and stacked on the 16th. The crop was threshed on November 18th, the straw and corn being weighed on that and the following days. The results are given below in Table VII.

TABLE VII.—PRODUCE OF WHEAT IN LANSOME FIELD in 1884, after SWEDES fed off with CAKE and CORN in 1881, BARLEY in 1882, PEAS in 1883.

Results calculated per Acre.

Plots & Acre each.	Manures used for Swedes in 1881.	Weight of Wheat.	Number of Bushels.	Weight per Bushel.	Straw.
		Tons. cwt. qrs. lbs.		lbs.	Tons. cwt. qrs. lbs.
1 A.	No manure ..	0 14 2 13	26·3	62·2	1 5 3 2
1 B.		0 19 0 14	34·4	62·2	1 9 1 15
Mean		0 16 3 13	30·3	62·2	1 7 2 8
2 A.	5 cwt. ground coprolites, cost 1l. per acre ..	0 15 1 17	27·8	62·0	1 5 1 13
2 B.		1 0 1 8	36·8	61·9	1 12 3 10
Mean		0 17 3 12	32·3	62·0	1 9 0 11
3 A.	5 cwt. dissolved coprolites, cost 1l. per acre ..	0 17 2 22	32·1	61·8	1 8 0 12
3 B.		0 19 2 12	35·4	62·0	1 9 0 27
Mean		0 18 2 17	33·7	61·9	1 8 2 20
4 A.	5 cwt. Redonda phosphate, cost 17s. 6d. per acre	0 19 1 12	35·2	61·6	1 10 3 9
4 B.		1 0 3 11	37·8	61·7	1 13 0 14
Mean		1 0 0 11	36·5	61·6	1 11 3 25
5 A.	4 cwt. precipitated phosphate, cost 1l. per acre ..	1 1 1 4	38·7	61·6	1 14 3 25
5 B.		0 13 3 3	24·7	62·5	1 1 1 27
Mean		0 17 2 3	31·7	62·0	1 8 0 26
6 A.	3 cwt. bone-meal, cost 22s. 6d. per acre	0 19 2 6	35·5	61·6	1 10 1 22
6 B.		0 15 1 27	27·8	62·4	1 1 2 9
Mean		0 17 2 2	31·7	62·0	1 6 6 1
7 A.	3 cwt. dissolved bones, cost 19s. 6d. per acre	0 18 0 5	33·1	61·1	1 9 1 21
7 B.		0 16 2 20	30·1	62·1	1 3 0 27
Mean		0 17 1 12	31·6	61·6	1 6 1 10
8 A.	3 cwt. dissolved coprolites and 2½ cwt. of Peruvian guano, cost 43s. 3d. per acre	0 19 1 4	35·5	60·6	1 11 1 0
8 B.		0 19 2 21	35·5	62·1	1 8 1 25
Mean		0 19 1 26	35·5	61·5	1 9 3 12

Here, as in 1883, the variations between the duplicate plots were apparent, *e.g.* in the two unmanured plots, and still more markedly in plots 2, 5, and 6. On the whole, Redonda phosphate (plot 4) has done best, though the highest produce was

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obtained from plot 5A manured with 4 cwts. of precipitated phosphate to the acre. Dissolved coprolites gave a better result than the same weight of ground coprolites. Very good crops were also obtained from the mixture of 3 cwts. of dissolved coprolites and $2\frac{1}{2}$ cwts. of Peruvian guano per acre. This closes the rotation begun in 1881.

RAINFALL at WOBURN during 1884 taken at 8 A.M. daily at CRAWLEY MILL FARM.

					Inches.
January	..	..	..	..	1.92
February	..	..	..	..	.82
March	..	..	..	..	1.05
April	..	..	..	..	1.52
May	..	..	..	..	.82
June	..	..	..	..	1.53
July	..	..	..	..	2.57
August	..	..	..	..	1.28
September	..	..	..	..	1.48
October	..	..	..	..	1.19
November	..	..	..	..	.95
December	..	..	..	..	2.71
Inches					17.84

RAINFALL in 1882, 1883, 1884.

					1882.	1883.	1884.
Inches..	..	..	..	..	28.14	24.20	17.84

DURING the HARVEST MONTHS of AUGUST and SEPTEMBER, the RAINFALL was—

					1883.	1884.
Inches	..	..	..	..	4.65	2.76

XIV.—Quarterly Reports of the Chemical Committee.**JUNE 1884.****DR. VOELCKER** reported the following cases:—

1. **Mr. P. M'Gregor**, of **Crowton Hall**, near **Northwich**, bought some dissolved bones at **8*l.* 5*s.*** per ton delivered, warranted made entirely of pure bones. Doubting the genuineness of them, he sent a sample on **March 13th**, which showed the following analysis:—

Moisture	14·41
*Organic matter	9·61
Monobasic phosphate of lime	15·40
Equal to tribasic phosphate of lime	(24·11)
Insoluble phosphates	6·81
Sulphate of lime, &c.	47·01
Insoluble siliceous matter	6·76
	100·00
* Containing nitrogen	·63
Equal to ammonia	·79

This is not made entirely of pure bones, but is an ordinary superphosphate, containing about 10 per cent. of bones. Such a manure can in most places be bought at **5*l.* 10*s.*** to **6*l.*** a ton.

No further information was given by the purchaser in reply to enquiries.

2. **Mr. W. Pering Paige**, of **Old Park**, **Waltham Cross**, sent, on **March 7th**, a sample of **London soot and sewage manure**, of which he had purchased 2 tons at **40*s.*** per ton, from the **New Carbolic Sanitary Company (Limited)**, **Works**, **Hackney Downs Railway Station** (established 1873); **W. Adams**, Joint Manager.

A circular sent to **Mr. Paige** gave, in addition to testimonials, the following:—

Analysis of sample of **London soot and sewage manure** received from the **New Carbolic Sanitary Company, Limited**, **Hackney Downs Station**, **London**:—

Analytical Laboratory, Hemel Hempstead, October 11th, 1883.

Moisture	7·85
Silica	48·00
Phosphate of lime	8·87
*Nitrogenous organic matter	35·78
	100·00

* Containing 2 per cent. of ammonia.

(Signed)

JOS. MELLOR.

Dr. Voelcker's analysis and report were as follows:—

Moisture	16·20
*Organic matter	10·11
Phosphate of lime	·54
Oxide of iron and alumina	3·11
Carbonate of lime, &c.	17·29
Insoluble siliceous matter	52·75
	100·00
* Containing nitrogen	·38
Equal to ammonia	·46

“This is a manure of but slight value, more than half of it being worthless sand; 2*l.* per ton is an absurd price, 7*s.* 6*d.* or 8*s.* per ton being quite enough to pay for it. Kindly fill up and return the enclosed form, and send invoice with it.”

Mr. Paige, in reply, forwarded invoice and receipt, with particulars, adding:—

“Before giving the order, I asked the manager or agent if he would guarantee the manure equal to analysis he had just given me. He said he would not, as they had a great demand for it, and were making it of better quality than when the analysis was taken, consequently I ordered a small lot to ascertain the value. My idea in using this low quality manure was to mix with nitrate and super, and by so doing would be better able to distribute with the machine.”

3. Mr. Edward Piper, of Tufton Place, Northiam, sent, on March 28th, a sample of the same manure as in the foregoing case, enclosing a similar circular, with analysis, testimonials, &c.

The analysis was:—

Moisture	17·81
*Organic matter	11·04
Oxide of iron and alumina, and traces of phosphate of lime	5·30
Carbonate of lime, &c.	21·30
Insoluble siliceous matter	44·55
	100·00
* Containing nitrogen	·43
Equal to ammonia	·52

And Dr. Voelcker wrote:—

“The sample of London soot and sewage manure which you sent me for analysis is, in my judgment, not worth cartage to a distance of five miles.

“I would not accept it as a gift if I had to pay carriage for it and to cart it a few miles to my farm.”

4. Mr. E. V. Wheeler, of Kyrewood House, Tenbury, sent, on March 16th, a sample of bone-meal he had bought at 8*l.* 10*s.* per ton delivered.

The analysis and report were:—

Moisture	14.35
*Organic matter	26.80
Phosphate of lime	24.06
Carbonate of lime, sulphate of lime, soda, &c. ..	33.19
Insoluble siliceous matter	1.60
	100.00
* Containing nitrogen	2.07
Equal to ammonia	2.51

DEAR SIR,—I beg to enclose analysis. No. 1 is adulterated bone-meal, and not worth more than 4*l.* 10*s.* per ton. Yours faithfully,
E. V. Wheeler, Esq. AUGUSTUS VOELCKER.

Mr. Wheeler, after receiving this Report, wrote on April 18 :—

“Kyrewood House, Tenbury, April 18th, 1884.

“DEAR SIR,—In answer to yours of this morning, the merchant from whom I brought the bone-meal states, as an explanation of the matter, that this meal did not come from his works, as it is an article which they do not make, but from a large collector of bones in the neighbourhood of Birmingham, from whom they had bought large quantity of quarter and half inch bones, for use in their works. That they had had articles bought from this man tested, and always found them pure, and therefore thought that they could trust him to send us a genuine article, but they suppose that he has taken advantage of them, thinking it would not be discovered in the bone-meal. They have offered to let me have the manure at whatever price I like to put upon it, and begged me to have the other two manures (samples of which I brought to you) tested.—Yours faithfully,

“Dr. Voelcker.

E. V. WHEELER.”

The other manures turned out satisfactory.

5. Mr. Henry Pye, of St. Mary's Hall, near Rochester, sent, on March 21st, two samples of manure, the price of which was 6*l.* per ton, and the seller, Mr. Reeves, of 17, Lilford Road, Camberwell.

The analyses were :—

	No. 1.	No. 2.
Moisture	13.65	11.55
*Organic matter	71.45	50.75
Phosphate of lime	.77	30.47
Carbonate of lime, &c.	13.88	6.88
Insoluble siliceous matter	.25	.35
	100.00	100.00
* Containing nitrogen	1.68	2.52
Equal to ammonia	2.04	3.05

Dr. Voelcker wrote :—

“March 28th, 1884.

“DEAR SIR,—I have the pleasure of enclosing analysis. No. 1 is a poor manure. It hardly contains any phosphates, and I should be sorry to have to pay 2*l.* a ton for it.”

"No. 2 is a better manure, but scarcely worth 6*l.* a ton, and 5*l.* 10*s.* would be a fair price for No. 2.

"Will you kindly say under what names the manures were sold, and be sure not to buy any more of No. 1, and No. 2 only if the enclosed analysis of the manure is guaranteed.

"H. Pye, Esq."

6. On May 1st, Mr. Henry Pye sent also a sample of so-called nitrate of soda, offered at 10*l.* 10*s.* a ton, the vendor being, as before, Mr. Reeves, of Camberwell.

This gave the following analysis:—

Water	7·14
Chloride of sodium	67·80
Sulphates of magnesia, soda, &c.	12·80
Nitrates of soda	12·26
	100·00

Good commercial nitrate of soda should contain not less than 95 per cent. of pure nitrate, and at that time was selling at about the above price.

7. Mr. W. Baker, of Moor Barns, Atherstone, purchased some manure sold to him as "bone-dust," at 6*l.* 15*s.* per ton delivered.

It gave on analysis:—

Moisture	23·41
* Organic matter	23·69
Oxide of iron and alumina	4·64
Phosphate of lime	1·66
Sulphate of lime, &c.	35·15
Insoluble siliceous matter	11·45
	100·00
* Containing nitrogen	1·22
Equal to ammonia	1·48

And Dr. Voelcker wrote:—

"W. Baker, Esq.

April 9th, 1884.

"DEAR SIR,—The manure sent by you is not bone-dust at all, but a refuse manure of but little value. You say you purchased it at 6*l.* 15*s.* per ton delivered. I would not give more than 25*s.* per ton for such a manure.—
Yours faithfully,

AUGUSTUS VOELCKER."

Further enquiries were made, but no other information was given.

8. Mr. T. F. Jackson, of Tattenhall, Chester, sent, on April 7th, two samples of boiled bones.

No. 2 gave on analysis:

Moisture	18·90
*Organic matter	20·95
Phosphate of lime	30·82
Carbonate and sulphate of lime, alkaline, salts, &c.	22·78
Sand	6·60
	100·00
* Containing nitrogen	1·86
Equal to ammonia	1·65

Dr. Voelcker reported on it as being adulterated, and not worth more than 4*l.* 8*s.* a ton.

No further particulars could be obtained.

9. Mr. P. S. Bach, of Elsieh-Bromfield, Salop, sent, on April 18th, a sample of boiled bones.

Dr. Voelcker's analysis and report were :—

Moisture	3·95
*Organic matter	14·40
Phosphate of lime	40·32
Sulphate of lime	85·42
Carbonate of lime, alkalies, &c.	4·21
Insoluble siliceous matter	1·70
	100·00
* Containing nitrogen	1·20
Equal to ammonia	1·45

"The sample which you sent me is adulterated with plaster of Paris. Genuine boiled bones contain fully 60 per cent. of phosphate of lime."

No more information could be obtained in this case.

10. Mr. Hanslip Long, of Shippey Hill, Ely, purchased 5 tons of "ground bones," warranted "pure," at 6*l.* 10*s.* per ton, and sent a sample on May 1st for analysis.

Dr. Voelcker's analysis and report were :—

Moisture	12·05
*Organic matter	23·56
Phosphate of lime	32·64
Carbonate of lime	6·35
Common salt, &c.	24·05
Sand	1·35
	100·00
* Containing nitrogen	3·64
Equal to ammonia	3·69

May 15th, 1884,

"DEAR SIR,—The sample which you sent me is shamefully adulterated with salt. Good ground bones contain on an average 46 to 48 per cent. of phosphate of lime, and yield not less than 4½ per cent. of ammonia. Genuine ground bones cannot be sold with a fair profit at 7*l.* per ton.—Yours faithfully,
"H. Long, Esq. AUGUSTUS VOELCKER."

11. Mr. A. W. Leedham, of the Ox Leasows, near Stone, Staffordshire, purchased 2 tons of quarter-inch steamed bones, at 6*l.* 10*s.* per ton.

A sample sent for analysis gave:—

Moisture	10·20
*Organic matter	7·30
Phosphate of lime	31·30
Carbonate of lime, sulphate of lime, &c.	44·65
Insoluble siliceous matter	6·55
	100·00
* Containing nitrogen	·60
† Equal to ammonia	·73

And Dr. Voelcker subsequently reported: "In my judgment the sample of bone-dust which you sent me for analysis a short time ago is not worth more than 3*l.* 15*s.* per ton."

In the preceding five cases the Committee have no guaranteed invoices of the manures before them, and the purchasers have either never required a guarantee, or have omitted to send such to the Consulting Chemist.

DECEMBER 1884.

1. On June 5th, 1884, Mr. J. Cole, of Dodford, Malford, Chippenham, sent a sample of linseed-cake for analysis, stating that two cows which had been feeding on it had died.

The following report was sent in reply:—

"June 11th, 1884.

"DEAR SIR,—I beg to enclose an analysis of the sample you sent me a short time ago.

"The cake is very hard pressed, poor in oil, and it moreover contains castor-oil bean, which is very poisonous. The cake is quite unfit for feeding purposes.—Yours faithfully,

AUGUSTUS VOELCKER."

Analysis.

Moisture	9·94
Oil	8·01
*Albuminous compounds	36·81
Mucilage, &c.	30·85
Woody fibre	8·90
Mineral matter (ash)	5·49
	100·00
* Containing nitrogen	5·89

AUGUSTUS VOELCKER.

In answer to enquiries it was ascertained that 42 cwt. of the cake had been bought in December, 1883, at 9*l.* 5*s.* per ton by Mr. Cole, for his sister, whose farm he managed, the cake having been purchased in Chippenham Market as good oil-cake

from Mr. W. A. Eyles, agent for Mr. J. Bevan, corn merchant, Trowbridge. Of 17 cows who ate the cake all were taken ill shortly after, two dying within two days, and the rest were so ill they could scarcely walk. The 15 nearly lost their milk for six or seven days, and did not recover for a month. Another cow which did not eat any of the cake remained perfectly well, but a horse which broke loose and got at some of the cake nearly lost its life. Mr. Bevan, on being applied to for compensation, admitted that the cake had been bought of him, but refused to allow anything, saying that no written guarantee was given at the time of purchase.

2. Mr. A. Ashdown, of Talbot Chambers, Shrewsbury, sent, together with other manures, on June 6th, 1884, one sample described as "sulphate of potash."

The analysis and report were:—

	June 24th, 1884.
Moisture	2.05
*Chloride of potassium	11.11
Chloride of sodium, &c.	86.84
	100.00
* Containing potash	6.57

"This is neither sulphate of potash nor genuine kainit.

"AUGUSTUS VOELCKER."

A second sample sent on June 27th, gave on analysis:—

Moisture	3.09
*Chloride of potassium	6.86
Chlorides of sodium, magnesium, and other salts	90.05
	100.00
* Containing potash	4.33

The manures had all been purchased through Mr. Ashdown, for the Duke of Cleveland, from merchants in Liverpool. The sulphate of potash (so called) being invoiced at 6*l.* 10*s.* per ton, 22 cwt., and guaranteed by the vendors at from 40 to 50 per cent., they explaining the wideness of the margin on the ground that they were not able to get any guarantee themselves on sulphate of potash, and were compelled to take it upon its merits.

Dr. Voelcker's analysis being so very much below the guarantee, the purchaser declined to pay for the potash. The vendors expressed their astonishment at the analysis, and honestly admitted that they did not import sulphate of potash, and when they received the order in question, simply bought the supply from a dealer; and having had another sample of it analysed

on their own behalf, which confirmed Dr. Voelcker, allowed a deduction of the whole amount charged for the potash from the bill. Mr. Ashdown subsequently wrote :—

“As I have always found the vendors very straightforward, and their articles almost always up to their guarantee, if the Chemical Committee think well to publish what happened with regard to the sulphate of potash, I think no benefit can be derived by publishing their names.”

This case shows how desirable it is that purchasers should have an analysis of sulphate of potash, or kainit, and how necessary it is that agents for merchants and manufacturers should themselves take care to have an analysis of the cake or manure which they offer to the consumer.

3. On July 16th, 1884, Mr. H. English, of Westwood House, Peterborough, sent a sample of cotton-cake, in reference to which the following reply was sent :—

Analysis of cotton-cake, branded “W. G. Pure” :— July 19th, 1884.

Moisture	11·21
Oil	3·20
*Albuminous compounds	16·75
Mucilage, sugar, &c.	37·34
Woody fibre	27·17
Mineral matter (ash)	4·83
	100·00
* Containing nitrogen	2·68

“The cotton-cake is a very inferior whole-seed cotton-cake; it is very poor in oil and albuminous compounds, and contains an excess of woody fibre in the shape of cotton-seed husks and cotton wool. I should not like to feed stock with such a cake.—(For Augustus Voelcker)

“JOHN AUGUSTUS VOELCKER.”

The cake was stamped “W.G. Pure,” 2 tons, at 6*l.* 5*s.* per ton, having been bought from Messrs. Hy. Leake and Son, King’s Lynn. Mr. English wrote subsequently :—“I have spoken to Messrs. Leake, finding fault with this parcel, having had much better for nearly a year past from them.”

4. Mr. Henry Mellish, of Hodsock Priory, Worksop, sent, on November 26th, 1884, a sample of linseed-cake and one of decorticated cotton-cake.

The report and analysis were as follows :—

“November 29th, 1884.

“DEAR SIR,—The linseed-cake is an impure cake, containing a considerable quantity of foreign seeds, &c. It is also of low quality. Was it sold to you as pure? The decorticated cotton-cake is pure, but contains some hard lumps, and requires to be finely ground before using it.—Yours faithfully (for Augustus Voelcker),

“JOHN AUGUSTUS VOELCKER.”

	Linseed-cake.	Decorticated Cotton-cake.
Moisture	18·73	7·34
Oil	10·07	15·50
*Albuminous compounds	21·66	41·43
Mucilage, &c.	87·87	25·31
Woody fibre	8·98	2·93
†Mineral matter (ash)	7·74	7·49
	100·00	100·00
* Containing nitrogen	3·46	6·62
† Including sand	8·20	..

Further enquiries about the linseed-cake showed that two tons had been purchased at 9*l.* 10*s.* per ton, and invoiced as "Burkitt's Pure," from Messrs. W. and S. Burkitt, Chesterfield.

After complaining about the cake, Mr. Mellish wrote on December 4th:—

"I may say that the cake was sold to me as pure, and this word appears in the invoice, and is stamped on the cake. The manufacturer, however, now tells me that it is made from 'linseed as imported,' and that he does not profess to guarantee it to be 95 per cent. pure, which he tells me is the standard of purity which you adopt."

And subsequently:—

"Hodsock Priory, Workop, December 6th, 1884.

"LINSEED CAKE, No. 1608.

"DEAR SIR,—Your letter of the 5th is to hand. My only object in waiting was, that I thought it more fair to the manufacturer to give him an opportunity of offering any explanation he could; but as the committee meets so soon, I enclose the particulars you require. I may add, that I was not aware who were the manufacturers previous to receiving your report. The letter of August 11 refers to a previous lot of cake of the same brand. The cakes have "Burkitt's Pure" stamped on them. You will observe that what I mentioned in my last letter about the cake being made from "Linseed as imported" and not being up to 95 per cent., is merely what the manufacturer has told me *since* receiving your report, and that I had heard nothing of it previously. He also mentioned that they made a purer cake, guaranteed 95 per cent., at a higher price. In fact, I understand his contention to be, that "pure" is a trade term for "linseed as imported," though he admitted that your analysis showed the sample to be of very inferior quality. I should add that both vendor and manufacturer seem anxious for a full investigation and have offered to make pecuniary satisfaction. Kindly return the invoice when you have done with it.—Yours truly,

"HENRY MELLISH."

"P.S.—Sunday Morning.—Since writing the above I have received a letter from Messrs. Burkitt enclosing analysis made by Mr. Penny, of Hull, of another sample taken from the same lot of cake, last Wednesday, copy of which I append. They also offer to allow me 10*s.* per ton on the cake."

From many cases that have come before the Committee, it is clear that many crushers make two classes of pure linseed-cake. On the one hand they make a cake labelled and invoiced pure from linseed as imported, and which, not infrequently, contains as much as 10 per cent. of weed-seeds and other matter. But for those who are inclined to give a higher price, they make a cake from linseed guaranteed to contain 95 per cent. of linseed which has been carefully screened since importation. Purchasers should consider for themselves whether it is not better worth while to give the higher price, and insist on the higher standard.

XV.—*Annual Report of the Consulting Botanist for 1884.*

By W. CARRUTHERS, F.R.S.

DURING the past year I have examined 701 samples of seeds for the Members of the Society, besides replying to inquiries regarding the nature, habits, and names of weeds, and the best way of dealing with them; the diseases of cultivated plants; and to various matters affecting the crops of the farm.

I have examined 69 samples of meadow fescue, and 46 of tall fescue, in all 115 samples, as compared with 85 in the previous year. In dealing with them, it is not necessary this year to include these two species, as I have done before, under one head, for the samples of tall fescue, though sometimes consisting only of meadow fescue, have, to a large extent, been true to the species. Sixty-five per cent. of the samples of meadow fescue were free from weeds and seeds of other grasses, as against 26 per cent. last year; 31 per cent. had three-quarters or more of the seed true, and only 4 per cent. were more impure. The principal adulterant employed is rye-grass; but the use of this seed is very greatly lessened, for it was found in only 22 samples, and in 17 of these it did not amount to 25 per cent., though one sample contained 50 per cent., and another 65 per cent., of this cheaper and less useful seed. Of the samples of tall fescue examined, 90 per cent. contained seeds of that grass, and of these, 24 per cent. were pure and true, 30 per cent. contained more or less of meadow fescue, and 9 per cent. consisted entirely of meadow fescue. Rye-grass was present in 50 per cent., and in 3 per cent. of these it amounted to more than half of the seeds. These proportions represent a very remarkable improvement in the quality of these two important seeds, and this improvement is still more remarkable when we

look at the germinating power of the grasses examined. The meadow fescues had only 8 per cent. below the standard recommended by the Council, and the greater proportion of the remainder were considerably better than that standard. In the case of the tall fescues, 18 per cent. were below the Council's standard for germination; while of the remainder many were decidedly better than the standard.

Fifty-nine samples of the smaller fescues have been examined. Greater attention has been given to secure true samples of the sheep's fescue, resulting in 90 per cent. of the specimens examined being true to that species. These seeds are very little adulterated, and the germination is often low, but there was a decided improvement in this respect over the previous year. Fifty-six per cent. were up to or beyond the recommended standard, but in several cases the germination was under 25 per cent.

The samples of cocksfoot (*Dactylis glomerata*, Linn.), amounting to 76, were, on the whole, pure. Six per cent. had a considerable quantity of small rye-grass seeds in them; and in one case 20 per cent. of the naked seeds of the Yorkshire fog (*Holcus lanatus*, Linn.) were included in the sample. Seventy-eight per cent. germinated up to or beyond the recommended standard, and only three samples were very low in germination, one of them giving only 1 per cent. of living seeds.

Of meadow fox-tail (*Alopecurus pratensis*, Linn.) I examined 65 samples, and found a fair proportion of them very good, and fully justifying the improved percentage adopted for the standard recommended by the Society. There is very little adulteration in this seed, and the presence of the small seeds of *Aira cæspitosa*, Linn., does not, to any appreciable extent, deteriorate the seed, as their size and weight are both small, and they are generally immature, and fail to germinate. Sixty per cent. of the samples were up to, or above, the standard specified by the Council. The injury done by the small thrips, which had more or less seriously affected all the samples except four, has such an important influence on the quality of this seed, that it would be an important gain if some of those engaged in the seed business would try to raise this seed in a country where the thrips is not known, and where the harvest season would secure the gathering in of the crop in good condition.

I have again to call attention to the prevalence of ergot in the seeds of fiorin (*Agrostis alba*, var. *stolonifera*). No less than 64 per cent. of the samples examined during the year were infested with this most dangerous fungus. Twenty per cent. of the samples were composed of chaff up to half their bulk.

A very small proportion of the samples of crested dogtail (*Cynosurus cristatus*, Linn.) contained seeds of *Molinia caerulea* and *Holcus lanatus*. Thirty-six per cent. of the samples were below the specified standard of germination.

I have examined 126 samples of clover; only 20 per cent. did not come up to the standard recommended by the Council, and the great majority of these samples failed only by a very small percentage in reaching that standard. Nineteen per cent. of the red clovers contained seeds of dodder, and 25 per cent. of the alsike had seeds of this destructive parasite.

Fewer samples of grass mixtures have been submitted to me during the past year, but the samples examined have more firmly convinced me that it is most undesirable for growers to purchase their seeds in this form. One mixture consisted entirely of rye-grasses, with some trefoil and a little clover, and, in addition, the rye-grass was infected with ergot. Another consisted of rye-grass with a few seeds of other grasses and clovers, but in the aggregate not amounting to 1 per cent. The following are samples of the mixtures that have come under my notice :—

	No. 886.	No. 950.	No. 1085.	No. 1158.
Rye Grass	20	19	21	22
Timothy	12	9	..	..
Foxtail	10	8	..	10
Meadow Grasses	9	..	12	12
Cocksfoot	8	13	14	21
Florin	7	..	..	..
Dogtail	5	1	..	4
Meadow Fescue	3	..	..	6
Hard Fescue	5	6	18	16
Sheep's Fescue	2	6	13	..
<i>Aira cæspitosa</i>	1	..	..	..
<i>Aira flexuosa</i>	3	1	11	4
Puell's Vernal Grass	1	2	10	4
Brome Grass	..	..	1	..
Yorkshire Fog	..	..	1	1
Red Clover	6	7	..	..
Alsike	5	9	..	..
White Clover	2	10	..	..
Trefoil	1	5	..	..
Rib-grass	1	4	..	..

My attention has been called to a very serious evil, which I have no reason to believe to be prevalent in the seed trade, but which may be put down perhaps by being exposed. A member of the Society sent me some samples of grasses for examination. I reported to him that the golden oat-grass was entirely the worthless grass called *Aira flexuosa*, and that the foxtail did

not contain more than 2 per cent. of ripe seeds. Another member, some six weeks subsequently, sent grasses which, on examination, I reported on in almost similar terms. I subsequently learned that the member who first consulted me had communicated the result of the first examination to the tradesman with the view of preventing the further distribution of such worthless or rather injurious seeds, and that the second set of samples had been obtained for the purpose of seeing whether the tradesman continued to send out knowingly such worthless seeds.

At the request of the Council I have completed the examination of a large series of diseased plants from India, forwarded through the India Office. A further series reached me on the eve of my departure for America, which still require to be investigated, and the results of the examination of the whole will, I hope, find a place in the next number of the 'Journal,' accompanied with illustrations of the parasitic fungi which have caused the serious injury to the cereal crops of India.

ADDITIONS TO THE LIBRARY IN 1884.

I.—PERIODICALS PRESENTED TO THE SOCIETY'S LIBRARY.

Presented by the respective Societies and Editors.

A.—ENGLISH, AMERICAN, AND COLONIAL PERIODICALS.

Agricultural Department, Annual Report for 1883, with Appendix. 1884.

Agricultural Departments of Foreign Countries, Reports of. 1884.

Agricultural Economist. Vol. XVI. 1884.

— Gazette. 1884.

— Almanack. 1885.

Agricultural Returns of Great Britain. 1884.

— Statistics, Ireland. 1884.

Agricultural Students' Gazette. 1884.

Arboricultural Society, Transactions of the English. Vol. I. Part I. 1884.

Athenæum. 1884.

Bath and West of England Society, Journal of the. 1883-4.

Bell's Weekly Messenger. 1884.

Bristol Mercury. 1884.

Bussey Institution, Bulletin of the. Vol. II. Part IV. 1884.

- Cleveland Bay Stud Book. Vol. I. 1884.
Clydesdale Stud Book. Vol. VI. 1884.
Coates's Herd Book. Vol. XXX. 1884.
County Gentleman. Vol. XXII. 1884.
Economist. Vol. XLII. 1884.
English Cart-horse Stud Book. Vol. V. 1884.
Essex Standard. Vol. LIV. 1884.
Farm and Home. 1884.
Farmer. 1884.
Farmer's Advocate. Vol. XIX. 7 Parts.
Farmer's Herald. 1884.
Field. 1884.
Geological Society, Journal of the. Vol. XL. 1884.
Hackney Stud Book. Vol. I. 1884.
Hereford Cattle, Herd Book of. Vols. X. to XIV.
Highland and Agricultural Society of Scotland, Transactions of the.
Vol. XVI. 1884.
Illustrated Journal of Agriculture, Montreal. 1884.
Institution of Civil Engineers, Proceedings of the. 4 Vols. 1884.
———— of Mechanical Engineers, Proceedings of the. 1884.
———— of Surveyors, Transactions of the. Vol. XVI. 1884.
Irish Farmer. 1883.
—— Farmer's Gazette. 1884.
Ironmonger. 1884.
Journal of Forestry. Vol. VIII. 1883-4.
Land Agents' Record. 1884.
Live-Stock Journal. 1884.
—— ——— Almanac. 1885.
Manchester Literary and Philosophical Society, Memoirs of the. Vol. VII.
1882.
——————— Proceedings of the. Vols.
XX., XXI., and XXII.
Mark Lane Express and Agricultural Journal. 1884.
Massachusetts, Agriculture of, 1883.
Meteorological Record. 1884. 2 Parts.
—— Society, Quarterly Journal of the. 1884.
Midland Counties' Herald. 1884.
Nature. 1884.
Newcastle Courant. 1884.
Newcastle Farmer's Club, Journal of the. 1884.
North British Agriculturist. 1884.
North Wales Black Cattle Herd Book. Vol. I. 1883.
Polled Herd Book. Vol. I. 1884.
Prairie Farmer. 1884.
Queensland, Statistics of the Colony of. 1883.
Royal Dublin Society, Scientific Transactions of the. Vols. I. and III.
Second Series.
—— Scientific Proceedings of the. Vol. III. Part 6, and
Vol. IV. 1-4.
Royal Geographical Society, Proceedings of the. 1884.

- Royal Institution of Great Britain, Proceedings of the. Vol. X. 1883-4.
 Royal Society of New South Wales, Journal of the. 1882 and 1883.
 Royal United Service Institution, Journal of the. 1884.
 Society of Arts, Journal of the. 1884.
 South Australia, Proceedings of the Royal Agricultural and Horticultural Society of. 1884.
 Statistical Abstract for the Principal and other Foreign Countries, from 1872 to 1881-2.
 Statistical Society, Journal of the. 1884.
 Statistical Tables relating to Home and Foreign Animals. 1884.
 Sussex Association for the Improvement of Agriculture. Annual Report, Season 1883.
 Tasmania, Statistics of the Colony of, for 1882.
 Trade and Navigation of the United Kingdom, Accounts relating to the, 1884.
 Veterinarian, The. 1884.
 Veterinary Journal. 1884.
 Welsh Black Cattle Herd Book. Vols. I., II., III. (Presented by Viscount Emlyn.)

B. LIST OF FOREIGN PERIODICALS.

- Berlin. Landwirthschaftliche Jahrbücher. Band XIII. Hefte 1-6. Supplement, 1884.
 ———. Journal für Landwirthschaft. 1884. Hefte 1-4.
 Brussels. Journal de la Société centrale d'Agriculture de Belgique. 1884.
 Buenos Aires. Anales de la Sociedad rural Argentina. Vol. XVIII. 1884. Nos. 1-4, 8-10, 12-22, 24.
 ———. Annuaire statistique de la Province de, pour 1882. 1883. 5 Parts.
 Celle. Protokolle der Sitzungen des Central-Ausschusses der königlichen Landwirthschafts-Gesellschaft. 1884.
 Christiania. Beretning om det Kgl. Selskab for Norges Veldets Tilstand og Virksomhed in Aaret 1883.
 Crosne. Le Poussin. 1884.
 Groningen. Handelingen van het Genootschap van Nijverheid in de Provincie Groningen. 1883-4.
 Habana. Boletín de la Sociedad Protectora de Animales y Plantas de la Isla de Cuba. 1884. 5 Parts.
 Hanover. Jahresbericht der königlichen Landwirthschafts-Gesellschaft zu Celle: Central-Verein für die Provinz Hannover für 1883-1884.
 Kiel. Jahresbericht der milchwirthschaftlichen Veruchs-Station zu Kiel für das Meierei. 1882-3.
 ———. Landwirthschaftliches Wochenblatt für Schleswig-Holstein. 1884.
 Montevideo. Memoria de la Direccion General de Inmigracion y Agricultura correspondiente al año 1883.
 Napoli. Annuario della R. Scuola Superiore d'Agricoltura in Portici. 1884. Vol. IV.
 Paris. Annales Agronomiques. Tome 10^{me}. Nos. 1-12. 1884.
 ———. ——— de l'Institut National Agronomique. No. 7. 1881-1882 and Sup. No. 8. 1882-1883.
 ———. Bulletin des Séances de la Société nationale d'Agriculture de France. 1884. Nos. 1-7.
 ———. Journal d'Agriculture Pratique. 1884.
 ———. Journal de l'Agriculture. 1884.

- Paris. Bulletin de la Société des Agriculteurs de France. 1884.
 —. Ministère de l'Agriculture. Bulletin. 1884. Nos. 2, 3, 5, 6, 8.
 Rome. Annali di Agricoltura. 17 Parts. 1884.
 —. Atti della Giunta per la Inchiesta Agraria e sulle condizioni della classe agricola.
 —. Bollettino di Notizie Agrari. 1884.
 —. Commissione d' Inchiesta per la Revisione della Tariffa Doganale. 1884.
 —. Relazione della Commissione Parlamentare per la Fillossera in Italia. 1883-4.
 Rouen. Extrait des travaux de la société centrale d'agriculture du Département de la Seine-Inférieure. 1884. 3 Parts.
 Stockholm. Kongl. Landtbruks-Akademiens Handlingen och Tidskrift. Nos. 1-6. 1884.
 Strasbourg. Bulletin Mensuel de la Société des Sciences, &c., de la Basse-Alsace. Vol. XVIII. 1884. 7 Parts.
 Valenciennes. Revue agricole de la Société d'Agriculture, sciences, et arts de l'arrondissement de Valenciennes. 1884.

II.—BOOKS PRESENTED OR OTHERWISE ADDED TO THE SOCIETY'S LIBRARY.

Names of Donors in Italics.

A. ENGLISH, AMERICAN, AND COLONIAL BOOKS AND PAMPHLETS.

- Agricultural and Horticultural Association, Limited.* Artificial Manures, 1884.
Baker, J. G., F.R.S., F.L.S. A Review of the Tuber-bearing Species of Solanum.
California State Mining Bureau. Third Annual Report of the State Mineralogist.
County Cork Agricultural Society. Reports of Experiments on Potato Culture. Nos. III., IV., and VI.
Dickson, James, and Sons. Farm Seeds. 1884.
 —. Grasses of the Fields. 1883.
 —. Hardily grown Forest and other Trees. 1884-5.
Dublin Society, The Royal. On the Fossil Fishes of the Carboniferous Limestones Series of Great Britain. By J. W. Davis, F.G.S. September, 1883.
Flax Supply Association. Seventeenth Annual Report, 1883.
Fleming, G. The Influence of Heredity and Contagion on the Propagation of Tuberculosis and the prevention of Injurious effects from consumption of the flesh and milk of Tuberculous Animals. By Herr A. Lydtin, G. Fleming, and M. Van Herken.
Fleming, G. Text Book of Operative Veterinary Surgery.
Gilbert, J. H. Introduction to the Study of the Scientific Principles of Agriculture, being the Inaugural Lecture delivered May 6, 1884, at the University Museum, Oxford.
Gladstone, Adam. History of the London Water Supply from the Creation of Man to A.D. 1884.
Haden, F. S. Earth to Earth: a plea for a more rational observance of the conditions essential to the proper burial of the dead.

Hulke, J. W., F.R.S. Address delivered at the Anniversary Meeting of the Geological Society of London on February 15th, 1884.

International Health Exhibition. Danish Dairy. By Alex. Maribo.

English Dairy. By Prof. J. P. Sheldon.

Japan. A Catalogue, with explanatory notes, of the Exhibits from the Department of Education.

A Descriptive Catalogue of the Exhibits sent by the Sanitary Bureau of the Japanese Home Department. Prepared under the direction of K. Nagai and J. Murai.

Jemmett, Alex. Farm Account Book.

Farmer's Pocket Book.

Jones, R. W. Artificial Feeding Stuffs, and how to use them.

Kinch, Edward. Natural and Artificial Food of Scotch Hill Sheep. By Robert Wallace and Edward Kinch.

Lawes, Sir J. B., and Gilbert, Dr. J. H. On the Composition of the Ash of Wheat-Grain and Wheat-Straw, grown at Rothamsted in different Seasons and by different Manures. 1884.

Mackay, R. Chemistry applied to Practical Agriculture, to which is appended the Projection of a New Government Bank of the People, to save the Agricultural Interests and Trade of the Country.

Maine Board of Agriculture. Twenty-fifth Annual Report of the Secretary of the, for 1881. 1882.

Manchester Literary and Philosophical Society. A Centenary of Science in Manchester. By R. Angus Smith. 1883.

Morton, J. Chalmers. Our Water Supply, a Local Study. 1884.

National Conference of Friends of Lord's Day Observance, held in Exeter Hall on March 19 and 20, 1884.

North-West Provinces and Oudh, Department of Agriculture and Commerce. Field and Garden Crops of the North-Western Provinces and Oudh, with illustrations, by J. F. Duthie and J. B. Fuller. Part II.

Ontario School of Agriculture, and Experimental Farm. Ninth Annual Report, for 1883.

Ormerod, Miss E. A. Report of Observations of Injurious Insects and Common Crop Pests during 1883, with methods of Prevention and Remedy. 1884.

Some Observations on the Cestridæ commonly known as "Bot Flies," especially the "Ox Warble Fly."

Pennsylvania. Reports of the State Board of Agriculture, for 1882 and 1883.

Revenue Settlement and Agriculture. Annual Report of the Department of Madras, 1884.

Shone, Isaac. Scientific and Sanitary versus Unscientific and Unsanitary Drainage, with an exposition of the new pneumatic (Shone's) Sewerage System. 1880.

Silos for British Fodder Crops. (2nd Edition.)

Smetham, Alfred. Lectures on Agricultural Chemistry.

Smithsonian Institution. Annual Report for 1882.

Society of Arts. Index to Journal. Vols. XXI. to XXX. (1872-1882).

Statistical Society. Statistics of Agricultural Production. By Major P. G. Craigie.

Stevens, H. R. On Ensilage of Green Forage Crops in Silos. 1881.

Thurber, Dr. G. Silos and Ensilage. 1881.

United States Department of Agriculture. Report for 1883.

Special Reports, New Series, Nos. 4, 5, 6, 7, 11, 12, 13. Miscellaneous: Special Report, No. 5.

Waring, G. E. The Memphis Sewers after four years' use.

- Warrington, Robert.* On Nitrification : a Report of Experiments made in the Rothamsted Laboratory. 1884.
- Wood-Mason, J.* Report on the Tea-mite and the Tea-bug of Assam. 1884.
- Woods, Henry.* Ensilage, its influence upon British Agriculture : also Southdown Sheep, their History, Breeding, and Management.
-
- Ensilage, its Origin, History, and Practice, with Experimental Trials and Results, and illustrated by Plans. 1883.

B. FOREIGN BOOKS AND PAMPHLETS.

- Barral, J. A.* Enquête sur le crédit agricole. Tome premier. Paris, 1884.
- Brull, M. A.* Mémoire sur la chaîne flottante des mines de fer de Dico. Paris, 1884.
- Capgrand-Mothes, M.* Rapport fait par M. Chatin sur un nouveau procédé de culture du Chêne-liège pratiqué par M. Capgrand-Mothes. Paris, 1882.
- Derome, A.* Perfectionnements dans la culture des céréales et des légumineuses. Lille, 1883.
- De Coruche, Le Vicomte.* Guide Pratique de Comptabilité Agricole avec exemples des cahiers employés.
- Eyth, Max.* Die königliche landwirthschaftliche Gesellschaft von England und ihr Werk. 1883.
- Flechet, M. F.* Monographie agricole de la petite contrée Herve-Aubel. Liège, 1884.
- Joly, Ch.* Note sur le parc national de Yellowstone aux Etats-Unis. Paris, 1884.
- Knauer, Ferdinand.* Der Rübensamen : Untersuchungen über seine Eigenschaften und Reflexionen über seine rationelle Züchtung. Gröbers.
- Lavalard, E.* Rapports sur les opérations du service de la cavalerie et des fourrages de la compagnie générale des omnibus de Paris, pendant l'exercice 1883. Paris, 1884.
- Leblanc, M.* Microbes et inoculations virulentes. Paris, 1884.
-
- Rapport général sur les maladies contagieuses observées en 1883 dans le département de la Seine. 1884.
- Lezé, M. R.* Rapport sur les progrès récents de l'industrie laitière en Danemark et en Hollande. 1884.
- Magnitot, M. Gaston de.* De l'ensilage et des fourrages verts suivi de la fénaison et de la mise en moyettes. Mantes, 1883.
- Pontzen, Ernest.* Première application à Paris en 1883 de l'assainissement suivant le Système Waring. Paris, 1884.
- Portici, Royal Agricultural College of.* Les meilleures plantes fourragères. 1883 and 1884.
- Røderer, Le Cte.* Mémoire sur la conservation des fourrages verts. Alençon, 1877.
- Scholtze, Karl.* Die Rückstände der Oelfabrikation als Futtermittel für die landwirthschaftlichen Nutztier, von Dr. Von Ollech. Leipzig, 1884.
- Stjernquist, Olof.* Om Humlen dess Odling, Behandling, Konservering och Kännetecken MM. Samt Humlehandeln med 75 illustrationer. Stockholm.

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XVI.—*Canadian Agriculture. Part II.—The Eastern Provinces.*
By Professor W. FREAM, B.Sc. Lond, F.L.S., F.G.S., College
of Agriculture, Downton, Salisbury.

INTRODUCTION.

EASTERN Canada, comprising Ontario, Quebec, and the Maritime Provinces, is much better known in England than the great prairie region to the west, and it does not therefore appear necessary to enter, other than briefly, into the physical features of the older Provinces. The climate of Canada does not in different parts vary so much as might be anticipated when the great geographical range of the Dominion is considered. There appear, however, to be seven definable belts or zones of climate, each tolerably distinct in its temperature, rainfall, and general meteorological characters: (1) the extreme eastern, embracing Newfoundland and part of Quebec; (2) the Gulf area, including Prince Edward Island, Nova Scotia, and part of New Brunswick; (3) the St. Lawrence area, embracing the Province of Quebec; (4) the Lake region, including Ontario and Hudson Bay south; (5) the great inland or prairie region extending over Manitoba and the North-West Territories; (6) the Rocky Mountains; (7) the Pacific range.

The following remarks on climate refer chiefly to Eastern Canada:—*

"Owing to the dry, clear, bracing atmosphere which generally prevails, the sense of discomfort produced by the raw easterly winds and damp fogs of an English spring suggests an idea of cold, such as is rarely thought of in a Canadian winter. There are, indeed, every winter a few days of intense cold, as in the summer there are brief periods of equally intense heat, when the thermometer ascends, or descends, through a scale unknown in the more

* 'Encyc. Brit.' 9th edition, 1876. Art. "Canada."

equable English climate. But throughout the greater part of the winter season in Canada the sky is bright and clear, and the weather thoroughly enjoyable. Open sleighs are in use by all. Sleighing parties of pleasure are arranged for the period of full moon, that they may return home over the snow, after an evening's enjoyment at some appointed rendezvous; skating, snow-shoeing, and other out-door exercises are in universal favour; and the sound of the sleigh-bells in the open thoroughfares adds to the exhilarating sense produced by the pure bracing atmosphere. Snow accordingly brings with it no such ideas of discomfort as are associated with it in England, while by the farmer it is hailed as altogether beneficial. In the Province of Quebec the snow begins to lie early in November; in Ontario it is fully a month later; and it differs correspondingly at various localities throughout the Dominion. But everywhere the appearance of the snow is hailed as seasonable and beneficial. It protects the wheat sown in autumn from the frost, affords facilities to the farmer for bringing his produce to market, aids the lumberer in collecting the fruits of his labour in the forest at suitable points for transport by water with the spring freshets, and so contributes alike to business and pleasure.

"January and February are the coldest months of the year. Throughout the whole of Canada steady sleighing is reckoned upon during those months. In Quebec and Manitoba a longer period of sleighing can be relied upon. In Nova Scotia, New Brunswick, and Prince Edward Island, and also the Pacific coasts, the temperature is modified both in summer and winter according to vicinity to the sea. Abrupt changes of temperature occur both in summer and in winter. A period of great cold early in the month of January is so frequently followed by a complete change, that its periodicity is reckoned upon under the name of the January thaw. Snow finally disappears in Quebec about the middle of April. In Ontario it is generally gone a month earlier.

"Ploughing usually commences in Ontario about the middle of April, and in favourable seasons is prolonged into the month of December. But throughout the Dominion, stretching as it does across the continent, and embracing an area nearly equal in size to Europe, the period varies with the locality, and is affected by the vicinity of the great lakes or other local influences. Cattle are turned out to graze in April, feeding in part upon the tender shoots of the spring forest growth, until the appearance of the young pasture with the disappearance of the snow. Before the end of July harvest begins; and with the rapidity of growth under the warm Canadian skies, the hay, grain, and root-crops follow in swift succession; the cleared land is brought again under the plough, and the autumn sowing of wheat is carried on till another abrupt change brings the season to a close. In this way the Canadian climate is marked by the striking contrast of two seasons—summer and winter,—bringing with them alternations of fruitful labour and of repose, intermingled with profitable industry and pleasure. This characteristic prevails with slight variations throughout the greater part of the Dominion. . . . Winter begins with crisp clear weather, which grows increasingly cold and cloudy. The wind wheels to the north-east, and with it comes the snow, and the long steady winter of the Canadian year."

The general character of the climate in Eastern Canada may be still further indicated by the following tables, containing a summary of the weather statistics for the year 1882 at four stations, in as many separate provinces. These tables are made up from the 'Report of the Meteorological Service of the Dominion of Canada for the year ending December 31, 1882,' which was published last year.

GENERAL METEOROLOGICAL REGISTER, TORONTO, ONTARIO, 1882, with Summaries for the Six preceding Years.

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	1882.	1881.	1880.	1879.	1878.	1877.	1876.
Mean Height of Barometer reduced to sea-level (Inches) ..	30.11	30.08	30.08	30.03	30.02	29.87	29.98	30.00	30.09	30.08	30.16	30.06	30.05	30.03	30.03	30.03	29.96	30.03	30.00
Mean Temperature of Air (Fahr.) ..	23.17	30.33	31.70	39.97	48.92	61.62	66.83	67.39	61.25	51.83	35.99	26.10	45.42	46.06	45.43	44.16	47.09	46.10	43.98
Highest Temperature	40.1	50.3	56.2	65.0	70.9	85.4	89.9	86.9	88.3	74.3	64.2	40.1	89.9	92.7	89.9	89.5	95.4	89.7	92.9
Lowest Temperature	-17.4	9.6	14.4	21.9	30.0	37.0	51.3	46.8	43.1	28.0	7.2	4.1	-17.4	-15.1	-8.3	-8.9	-9.0	-13.9	-9.5
Greatest Daily Range	36.0	25.9	24.1	32.9	27.3	29.9	30.6	27.5	25.2	26.0	18.3	28.2	36.0	40.9	30.8	34.1	28.6	33.2	42.1
Rainfall in Inches ..	1.23	1.18	1.55	1.01	3.58	2.63	1.07	2.52	2.09	1.15	1.39	1.21	20.59	21.14	30.92	22.52	43.39	21.89	21.6
Number of Days' Rain	6	7	10	7	11	12	11	14.	8	8	9	7	110	123	140	107	132	116	117
Snowfall in Inches ..	7.8	5.4	5.7	0.2	..	..	..	..	..	..	7.6	15.8	42.5	57.6	44.0	68.5	51.0	37.3	113.4
Number of Days' Snow	13	8	11	3	..	..	..	..	..	..	..	18	53	64	78	79	56	54	76
Number of Fair Days	16	14	15	20	20	18	20	17	22	23	13	11	209	191	163	188	202	204	186
Number of Thunder-storms ..	..	..	1	2	..	4	5	7	5	3	1	..	28	24	47	37	30	33	19
Number of Hours' Sunshine ..	103.6	115.4	148.9	203.8	234.4	276.7	289.3	234.8	245.2	211.5	78.1	27.8	2169.5	..	..	..	..	..	..
Ratio to possible Sunshine ..	0.36	0.39	0.40	0.50	0.51	0.59	0.61	0.51	0.65	0.62	0.28	0.10	0.46	..	..	..	..	..	..

GENERAL METEOROLOGICAL REGISTER, MONTREAL, PROVINCE OF QUEBEC, 1882.

	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	Entire Year.
Mean Height of Barometer reduced to Sea Level (Inches)	30.11	30.09	30.05	29.97	29.99	29.80	29.90	29.96	30.06	30.06	30.11	30.03	30.01
Mean Temperature of Air (Fahr.)	12.20	21.04	25.05	35.59	49.68	62.72	67.64	68.34	58.21	49.43	31.36	17.67	41.58
Highest Temperature	42.4	46.2	47.0	57.2	67.5	86.7	84.9	91.0	79.1	74.7	60.6	57.1	91.0
Lowest Temperature	-26.0	-8.5	1.4	13.1	27.1	43.9	50.8	48.0	40.6	30.5	14.3	-5.3	-26.0
Greatest Daily Range	36.1	33.0	28.8	23.5	30.0	27.5	22.0	25.0	21.5	24.1	24.8	30.2	36.1
Rainfall in Inches	1.18	0.58	2.46	1.58	1.50	4.74	6.04	2.52	3.63	1.34	1.39	0.04	27.00
Number of Days' Rain	4	4	8	11	15	20	17	11	12	14	14	3	133
Snowfall (in Inches)	28.2	23.2	15.3	3.2	0.5	..	..	..	..	..	1.0	39.8	111.2
Number of Days' Snow	20	13	15	5	1	..	..	..	..	..	5	24	83
Number of Fogs	3	1	3	..	..	..	..	..	2	4	6	1	20
Number of Thunderstorms ..	..	..	..	1	..	4	7	3	4	1	1	..	21

GENERAL METEOROLOGICAL REGISTER, ST. JOHN, NEW BRUNSWICK, 1882.

	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	Entire Year.
Mean Height of Barometer reduced to Sea Level (Inches)	29.96	30.04	29.98	29.91	29.97	29.80	29.95	29.97	30.01	30.05	30.03	29.95	29.97
Mean Temperature of Air (Fahr.)	18.18	21.03	27.53	32.96	44.10	55.72	59.04	59.36	55.31	47.80	33.87	23.36	39.78
Highest Temperature	41.0	41.0	45.0	49.0	60.0	79.0	74.0	82.0	74.0	63.0	62.0	48.0	82.0
Lowest Temperature	-11.0	-6.0	-8.0	6.0	27.0	41.0	44.0	44.0	37.0	31.0	18.0	5.0	-11.0
Greatest Daily Range	36.0	28.0	40.0	21.0	26.0	27.0	24.0	27.0	23.0	20.0	17.0	37.0	40.0
Rainfall in Inches	1.02	2.47	3.83	1.54	3.14	6.66	4.64	1.89	4.59	3.34	1.19	1.39	35.70
Number of Days' Rain	5	3	6	6	11	13	14	4	14	12	5	3	96
Snowfall in Inches	35.0	50.0	23.2	24.6	2.5	..	..	..	..	..	11.0	12.4	158.7
Number of Days' Snow	16	10	10	10	1	..	..	..	..	..	7	12	66
Number of Fogs	..	..	..	4	3	6	9	9	9	10	1	1	52
Number of Thunderstorms ..	..	..	..	..	..	3	2	2	1	..	..	..	8

GENERAL METEOROLOGICAL REGISTER, HALIFAX, NOVA SCOTIA, 1882.

	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	Entire Year.
Mean Height of Barometer reduced to Sea Level (Inches)	29.97	29.97	29.99	29.92	29.99	29.84	29.98	29.99	30.06	30.06	30.01	29.93	29.99
Mean Temperature of Air (Fahr.)	21.59	22.65	28.08	33.30	44.26	56.97	64.13	64.45	58.42	49.72	36.87	27.20	42.30
Highest Temperature	47.6	42.9	44.3	55.8	69.4	78.6	86.7	90.2	80.3	70.8	63.8	50.0	90.2
Lowest Temperature	-8.0	-2.9	9.0	13.2	28.1	39.0	47.6	44.6	40.4	30.0	25.8	11.0	-8.0
Greatest Daily Range	32.1	34.3	24.0	27.0	29.9	32.9	28.7	35.7	27.3	22.3	23.1	31.0	34.3
Rainfall in Inches	3.16	1.67	5.46	3.68	4.66	5.51	5.18	3.93	5.92	7.52	0.81	1.31	48.81
Number of Days' Rain	9	5	9	8	14	17	15	11	17	13	8	7	133
Snowfall in Inches	36.8	42.3	15.9	11.2	..	..	..	..	..	..	5.6	21.4	133.7
Number of Days' Snow	13	15	13	11	..	..	..	..	..	..	7	15	74
Number of Fogs	2	1	5	3	10	13	8	6	7	8	1	0	59
Number of Thunderstorms	..	..	..	..	..	3	1	1	2	..	..	..	7

It is to be regretted that, although this is the twelfth annual report, it contains no summary of the results of the eleven preceding years' observations, which would undoubtedly have enhanced the value of the publication, besides affording useful figures both for comparison and for the foundation of general statements.

The flora of Eastern Canada, and indeed of the Atlantic borders of North America generally, presents a similarity to that of the other side of the ocean which cannot fail to attract notice, but, in receding westward or southward, the similarities are found to be overshadowed by the differences. As bearing on this interesting subject, I take the following remarks from Professor Asa Gray's paper on the 'Characteristics of the North American Flora':—

"In the fields and along open roadsides the likeness (to the flora of Western Europe) seems to be greater. But much of this likeness is the unconscious work of man, rather than of nature, the reason of which is not far to seek. This was a region of forest, upon which the aborigines, although they here and there opened patches of land for cultivation, had made no permanent encroachment. Not very much of the herbaceous or other low undergrowth of this forest could bear exposure to the fervid summer's sun; and the change was too abrupt for adaptive modification. The plains and prairies of the great Mississippi Valley were then too remote for their vegetation to compete for the vacancy which was made here when forest was changed to grain-fields and then to meadow and pasture. And so the vacancy came to be filled in a notable measure by agrestial plants from Europe, the seeds of which came in seed-grain, in the coats and fleece and in the imported fodder of cattle and sheep, and in the various but not always apparent ways in which agricultural and commercial people unwittingly convey the plants and animals of one country to another. So, while an agricultural people displaced the aborigines which the forest sheltered and nourished, the herbs, purposely or accidentally brought with them, took possession of the clearings, and prevailed more or less over the native and rightful heirs to the soil,—not enough to supplant them, indeed, but enough to impart a certain adventitious Old World aspect to the fields and other open grounds, as well as to the precincts of habitations. In spring-time you would have seen the fields of this district (Montreal) yellow with European Buttercups and Dandelions, then whitened with the Ox-eye Daisy, and at midsummer brightened by the cerulean blue of Chicory. I can hardly name any native herbs which in the fields and at the season can vie with these intruders in floral show. The common Barberry of the Old World is an early denizen of New England. The tall Mullein, of a wholly alien race, shoots up in every pasture and new clearing, accompanied by the common Thistle, while another imported Thistle, called in the States 'the Canada Thistle,' has become a veritable nuisance, at which much legislation has been levelled in vain. . . .

"Opportunity may count for more than exceptional vigour; and the cases in which foreign plants have shown such superiority are mainly those in which a forest-destroying people have brought upon newly-bared soil the seeds of an open-ground vegetation. . . .

"That it is opportunity rather than specially acquired vigour that has given Old World weeds an advantage may be inferred from the behaviour of our weeds indigenous to the country, the plants of the unwooded districts—prairies or savannas west and south—which, now that the way is open, are coming in one by one into these eastern parts, extending their area continually, and holding their ground quite as pertinaciously as the immigrant denizens. Almost every year gives new examples of the immigration of campestrine

western plants into the Eastern States. They are well up to the spirit of the age: they travel by railway. The seeds are transported, some in the coats of cattle and sheep on the way to market, others in the food which supports them on the journey, and many in a way which you might not suspect, until you consider that these great roads run east and west, that the prevalent winds are from the west, that a freight-train left unguarded was not long ago blown on for more than one hundred miles before it could be stopped, not altogether on down grades, and that the bared and mostly unkempt borders of these railways form capital seed-beds and nursery-grounds for such plants."

As regards the composition of the arboreal vegetation of British North America, the same high authority adds:—

"The Coniferæ native to the British Islands are one Pine, one Juniper, and a Yew; those of Canada proper are four or five Pines, four Firs, a Larch, an Arbor-Vitæ, three Junipers, and a Yew; fourteen or fifteen to three. Of Amentaceous trees and shrubs, Great Britain counts one Oak (in two marked forms), a Beech, a Hazel, a Hornbeam, two Birches, an Alder, a Myrica, eighteen Willows, and two Poplars—twenty-eight species in nine genera, and under four natural orders. In Canada there are at least eight Oaks, a Chestnut, a Beech, two Hazels, two Hornbeams of distinct genera, six Birches, two Alders, about fourteen Willows and five Poplars, also a Plane tree, two Walnuts, and four Hickories; say forty-eight species, in thirteen genera, and belonging to seven natural orders. The comparison may not be altogether fair; for the British flora is exceptionally poor, even for islands so situated. But if we extend it to Scandinavia, so as to have a continental and an equivalent area, the native Coniferæ would be augmented only by one Fir, the Amentaceæ by several more Willows, a Poplar, and one or two Birches; no additional orders nor genera."

The extent of land under cultivation in Canada is at present about 22,000,000 acres, besides about 7,000,000 acres under improved pasture. The average size of Canadian farms is, according to Professor Brown, of Guelph, a little under 150 acres. The average annual gross value of produce is 4*l.* 12*s.* per acre over all the Provinces, the extremes being 8*l.* 12*s.* and 3*l.* Clear profit, after paying for labour, maintenance, interest on capital, and other charges, may be put at an average of over 12*s.* per acre. The average farm carries live-stock to the value of 1*l.* 12*s.* per acre. The annual taxes upon land consist of a township rate, a school rate, and a county rate, amounting in all to an average of 5*d.* per acre. Land is being actually occupied at the rate of 380,000 acres per annum, and reclaimed at the rate of 100,000 per annum. Within recent years wheat-production has increased at the rate of 70,000 acres per annum. The population is still essentially an agricultural one, for there are not many large aggregations of non-farming classes in any part of the Dominion. The annual value of produce per acre is very considerably less than from the older cultivated lands in England, and the annual expenditure per acre, including labour and fertilisers, is remarkably low.

The general characters of Canadian farming are somewhat distinct in the different Provinces. Ontario agriculture is of

quite a British type in cropping and stock farming, but with a larger proportion of grain and less pasture, and with fewer cattle and sheep per acre. In Quebec, the mode of farming is suggestive of a large market-gardening system, with live-stock suited to French requirements. And in the Maritime Provinces, where barley, oats, and potatoes constitute the staple crops, there exists, or did exist till recently, a somewhat general indifference to improved live-stock.

As the Provinces of Eastern Canada are well defined, and as their collective area is very large, it seems desirable to enter somewhat into detail concerning the agricultural features of each. Before doing so, however, and as it may save a considerable amount of repetition later on, it may be well to give some account, first, of the cattle trade, and, secondly, of the dairy industry of Canada.

THE CANADIAN CATTLE TRADE.

The cattle trade of Canada is increasing with very great rapidity. It has passed out of the tentative stage and has grown into an enormous business, in which hundreds of thousands of dollars have been invested by shrewd practical men. It embraces, on the one hand, the importation of pure-bred animals with the object of improving Canadian stock; and, on the other, the exportation of cattle and sheep to supply the English meat-market. The number of the former is, as might be expected, very insignificant as compared with that of the latter. And yet it was so recently as the year 1874 that the exportation of Canadian cattle across the Atlantic was commenced, the shipment that year numbering 455 head, since when the quality of the stock has undergone material improvement, and the prices realised have fully met the expectations of the dealers interested in the traffic. To Mr. John Dyke, the Canadian Government Agent at Liverpool, belongs the credit of having initiated this trade. The following figures show the official returns of cattle and sheep exported to Europe during the last eight years from Canadian ports:—

Year.	Cattle.	Sheep.
1877	6,940	9,504
1878	18,655	41,225
1879	25,009	80,332
1880	50,905	318,148
1881	45,535	62,401
1882	35,738	75,905
1883	55,625	114,352
1884	61,843	67,197

The total annual value of the cattle shipped from Canada seven or eight years ago was less than 80,000*l*. The value of the imports of live-stock from Canada into the United Kingdom during the last two years, is returned by the Board of Trade as follows :—

	1883.	1884.
	£	£
Oxen and Bulls ..	1,115,470	1,260,465
Cows	24,159	40,351
Calves	137	122
Sheep and Lambs..	215,742	125,841
Swine	6	149
	£1,355,514	£1,426,928

Although I was in Montreal only for a week in August, I noticed nearly every day large droves of cattle on their way to the wharves on the banks of the St. Lawrence for shipment in the Atlantic steamers, and it is hardly possible in the summer to cross from Liverpool to Quebec without sighting one or more steamers laden with cattle for Glasgow or Liverpool. The following statement presents another view of the export trade in Canadian cattle, as it specifies the port of shipment, and shows the number and value of horned cattle shipped at the several ports mentioned :—

YEAR.	Montreal.		Quebec.		Halifax.	
	No.	Value.	No.	Value.	No.	Value.
		£		£		£
1879	17,616	280,560	2,716	28,425	22	252
1880	27,474	401,633	4,313	35,377	913	15,913
1881	33,665	456,296	11,761	107,205	2,408	47,925
1882	30,243	397,663	7,385	71,630	3,296	64,318
1883	33,946	580,626	1,593	26,755	1,064	20,493
1884	57,552	1,438,800	680	17,000	3,611	90,275
Total	200,496	£3,555,578	28,448	£286,392	11,314	239,176

Whence is derived the following summary (p. 387) of the number and value of the horned stock shipped from the ports specified during the six years 1879 to 1884.

Live-Stock Quarantine.—The privilege that Canada enjoys in the immunity of her live-stock from disease is one that she does well to guard with the utmost jealousy, and all cattle entering

	No.	Value.
		£
Montreal	200,496	3,555,578
Quebec	28,448	286,392
Halifax	11,314	239,176
Total	240,258	£4,081,146

the Dominion are subjected to a rigid quarantine. I have already given some account of the regulations respecting the admission of cattle from the Western States of the Union into Manitoba and the North-West, and this seems an appropriate place in which to sketch briefly the history of the live-stock quarantine in Eastern Canada. The terrible outbreak of foot-and-mouth disease and of pleuro-pneumonia in England, in the year 1875, led the Canadian Parliament to pass an Act prohibiting the importation of cattle from the mother country. Notwithstanding this prohibition, Mr. Whitfield, a wealthy West India merchant, possessing an extensive stock farm at Rougemont, Province of Quebec, tried to import some thirty thoroughbred cattle from Liverpool, hoping his plea of improving Canadian live-stock would lead to an exception being made in his favour. But the Department of Agriculture remained firm, and Mr. Whitfield had to remove his cattle to Newfoundland, whence they were re-shipped to England and sold at an enormous loss. It is pleasant to be able to record, however, that Mr. Whitfield has now upon his Rougemont estate, which he has recently placed at the temporary disposal of the Provincial Government as a model farm, upwards of 100,000*l.* worth of carefully selected and imported pedigree live-stock.

The case just mentioned was brought under the notice of the authorities at Ottawa by Dr. McEachran, of Montreal, who represented that it was a serious drawback to the cattle raisers and breeders of Canada to be prohibited from importing live-stock from across the Atlantic. The result was the establishment, in 1876, of the first live-stock quarantine station in Canada. An admirable site was chosen in the interior of the Government fort at Point Levis, on the south shore of the St. Lawrence, opposite Quebec. The accommodation, small at first, has been extended, till now some fifty acres of land inside and outside the fortifications are occupied by the station; there are eighteen sheds, and as many as 700 head of cattle can be accommodated at one time. For the first three years the quarantine was limited to the insufficient period of eight days, but

this was changed in 1879 to ninety days, at which period it has since stood. Dr. McEachran, of Montreal, is Dominion Inspector of quarantine, and Dr. Couture, of Quebec, is the local assistant, and the object of the quarantine is to prevent the introduction into Canada of all or any of the following diseases: rinderpest, contagious pleuro-pneumonia, and foot-and-mouth disease, in the case of cattle; foot-and-mouth disease, foot-rot, and scab, in the case of sheep; and hog-cholera in the case of swine.

The Government possess sufficient land to enlarge the quarantine station to 150 acres, if necessary. The sheds are so arranged that each one is surrounded by from two to three acres of land. Cattle arriving by one vessel are kept quite isolated from those arriving by another, a space of 10 feet to 14 feet being fenced off between the grounds occupied by the different shipments. The sheds are of various sizes, and contain single rows of stalls, each stall being 8 feet wide, and allowing 4 feet for each of its occupants. The sheds are 16 feet wide, 16 feet high in front, and 8 feet behind, and are well ventilated both in summer and in winter. Scrupulous cleanliness is observed both in the yards and in the sheds. Importers pay no charge for quarantine, but they provide food, attendance, and litter, either straw or sawdust. The buildings and fences have hitherto cost from 4000*l.* to 5000*l.* The fences are all movable. The annual cost of maintenance of the station is about 1600*l.*

It is obvious that the Government of Canada are determined to spare no effort or expense to keep the cattle of the Dominion pure and healthy, and free from all contagious disease, and the steps which have been resorted to for this purpose cannot but command the sympathetic admiration of English farmers. The Canadian argument on the subject is simple enough: "If we let disease find its way into the Dominion, the cattle we export will be liable to carry it with them, and our country will be scheduled by the authorities in England." Much of the efficiency of the present system of quarantine is due to the energy of the Dominion Minister of Agriculture, the Hon. John Henry Pope, who very soon after he entered office sent an official into the New England States to inquire into the truth of rumours as to the diseased condition of many American animals. These rumours were verified, whereupon American cattle were prohibited from entering Canada, and Mr. Pope, having informed the British Government of this fact, and demonstrated further that no disease existed in the Dominion, had the satisfaction of seeing Canada removed from the schedule, since when Canadian cattle have had free access to the English markets, both at the seaports and at inland stations. Exporters of Canadian cattle

have practically abandoned the New England ports as places of shipment, and now utilise to the fullest extent the facilities offered by the St. Lawrence route. All cattle and sheep sent from Canada are submitted to veterinary inspection before shipment. Further proof of the extreme care which is taken to keep Canada out of the schedule is afforded by the fact that, on this side of the Atlantic, the High Commissioner for Canada, the Hon. Sir Charles Tupper, K.C.M.G., has maintained a rigid inspection of all live-stock passing either way between this country and the Dominion, and Mr. John Dyke, the able and courteous agent of the Canadian Government at Liverpool, exercises a watchful supervision over all cattle which arrive there from, or leave there for, Canadian ports.

So highly appreciated is the system of quarantine at Quebec, that a very large proportion of the cattle destined for the United States now enter by this route, and it is estimated that of cattle imported for States west of Ohio, fully 75 per cent. go by way of Quebec. The following statement not only illustrates the rapid growth in the importation of live-stock from Europe, but serves to show the number of animals which have been landed at Quebec since the establishment of the quarantine in 1876:—

	Cattle.	Sheep.	Pigs.	Total.
1876	109	305	17	431
1877	..	124	38	162
1878	45	113	17	175
1879	114	369	6	489
1880	396	400	..	796
1881	701	1100	40	1841
1882	1209	1124	22	2355
1883	1867	603	41	2511
1884	1607	473	26	2106

An analysis of the imports at Quebec in 1882 gives the following results:—

	Cattle.	Sheep.	Pigs.
For Canada	574	998	22
For United States ..	635	126	..
	1209	1124	22

The Canadian import was distributed among the various provinces thus:—

	Cattle.	Sheep.	Pigs.
Ontario	286	878	19
Quebec	244	117	3
North-West Territories	23	..	..
Manitoba	12	..	..
Nova Scotia	8	3	..
New Brunswick ..	1	..	..
	574	998	22

The following is a summary of the breeds imported in 1882:—

CATTLE.

	Shorthorn.	Hereford.	Polled Angus.	Galloway.	Devon.	Sussex.	West Highland.	Shetland.	Ayrshire.	Jersey.	Holstein.*	Total.
For Canada	90	31	323	56	7	10	19	5	17	16	..	574
For United States	14	142	263	166	..	..	..	..	..	..	50	635

All these cattle underwent a quarantine of ninety days from the date of sailing from the European port, and no disease of a contagious nature was found to exist amongst them.

SHEEP.

	Oxford Down.	Shropshire.	Southdown.	Hampshire Down.	Cheriot.	West Highland.	Leicester.	Cotswold.	Lincoln.	Total.
For Canada	163	512	33	10	110	12	17	50	91	998
For United States	84	22	..	..	..	20	..	..	..	126

Thus, almost a thousand pure-bred sheep, many of them prize-winners, were imported in 1882. Ontario takes the lead both in importation and in exportation.

* The cattle called "Holstein" on the American Continent are really Dutch. The true Holstein breeds are kept on the Marshes of Holstein, and very much resemble our unimproved and unpedigreed Shorthorns.—EDIT.

PIGS.

	Berkshire.	Suffolk.	TOTAL.
For Canada	18	4	22

This is less than half of the import of the preceding year, and indicates that hog-raising is not progressing in Canada. Both sheep and pigs are allowed to proceed to their destination if, on inspection at Quebec, they are found to be free from disease. The live-stock imported in 1884 through the Quebec quarantine were distributed as follows :—

	Cattle.	Sheep.	Pigs.
To Canada	323	303	20
To United States ..	1284	170	6
Total	1607	473	26

The Quebec quarantine has attracted so much notice in the United States, that in August, 1882, it was visited and inspected by the American Treasury Cattle Commission, whose function it was to establish and maintain a proper system of cattle quarantine for live-stock imported from Europe under the supervision of the Treasury Board at Washington, which controls all matters connected with the imports and exports of the country. The Sundry Civil Appropriation Bill of 1881 granted 10,000*l.* for the establishment of cattle quarantine stations at such ports as New York, Boston, Baltimore, and Philadelphia. But American importers, having got used to the Quebec route, like it so much, and the Grand Trunk Railway gives such facilities by running fast through cattle trains to Chicago, that it will require very considerable inducements to bring about a change. The cost, too, at Quebec (2*l.* to 3*l.*) is less than at the United States ports. Not only is Quebec the cheapest port for this trade, but it commands a shorter route, and the infected districts of the United States, east of the Alleghanies, are avoided.

It is necessary to add here that, for breeding purposes exclusively, American cattle are allowed to enter Canada, under strict quarantine, at Point Edward and one or two other places.

Canadian Breeders.—At this stage I may appropriately introduce a brief summary of the leading breeders of cattle in Canada. Commencing with Shorthorns, or Durhams, as they

are more commonly termed in the Dominion, the Hon. M. H. Cochrane, of Hillhurst, Compton, Province of Quebec, is the foremost breeder, not only in Canada, but in America. He achieved a great success with his celebrated cow, "10th Duchess of Airdrie," ten animals, all issue of this cow or of her daughters, having been sold by Mr. Cochrane for an aggregate of 32,900*l*. The principal importers of Shorthorns during recent years have included Mr. J. J. Davidson, Balsam, Ont.; Mr. Gibson, Ilderton, Ont.; Mr. Geo. Whitfield, Rougemont, P.Q.; Mr. Attrill, Goderidge, Ont.; and the Bow Park Co., Brantford, Ont.

During the four years, 1880-83, fully one-half of all the cattle imported by the St. Lawrence route were Herefords. Mr. Stone, Guelph, Ont., was about the first importer of this breed into Canada; while Mr. R. Pope, Cookshire, P.Q., now owns one of the largest and best herds in the Dominion. Rather more than thirty years ago, Mr. Killam, a farmer in the Eastern Townships, imported a Hereford bull, which was the first appearance of the breed in the Province of Quebec. The principal Hereford herds belong to the Hon. M. H. Cochrane; Mr. Dawes, Lachine, P.Q.; Mr. C. C. Bridges, Shanty Bay, Ont.; and Mr. Geo. Whitfield.

Passing on to Polled Aberdeen-Angus, in 1880 Mr. George Whitfield imported a very good lot of these cattle, including "Judge," a bull bred by Sir George McPherson Grant, of Ballindalloch, Scotland, and two or three high-bred heifers. In the fall of the same year the Hon. J. H. Pope imported a bull and three heifers, and in 1882 this gentleman made a fresh importation of the finest specimens that could be got in Scotland. When Polled Angus were first sent as far west as St. Louis, a few years ago, the report spread that some *nigger cattle* had arrived!

The success which followed the introduction of the Polled Angus into Canada served to bring the Galloways into notice, especially as the demand for the former had very much hardened prices. Consequently, in 1882, a few Galloways were imported, though the first introduction of this breed into Canada was effected more than thirty years ago by Mr. McCrae, Guelph, Ont. Mr. Whitfield, Mr. D. Morris, St. Thérèse, P.Q., and Hon. M. H. Cochrane, Compton, have made recent importations.

Sussex and Devon cattle are practically unknown in Canada, as they are only to be seen on the model farm of Mr. Whitfield, at Rougemont, P.Q., and on the Ontario Experimental Farm, at Guelph, and there are a few in New Brunswick.

Ayrshires have been and still are very popular in Canada; but, so far as Ontario is concerned, the opinion is gaining ground that they are not suited to that Province. Up to the present

time, however, they may be seen in all the dairying districts both of Ontario and Quebec.

Jerseys are making rapid headway, both in Canada and in the United States. In 1883, Mr. V. E. Fuller's grand cow, "Mary Ann of St. Lamberts," 9770, secured an official record, made under the auspices of the Canadian Jersey Breeder's Association, of 24 lbs. 13 oz. butter in 7 days, and for $3\frac{1}{2}$ days of the same week 13 lbs. 4 oz., being at the rate of 26 lbs. 8 oz. in 7 days. She was subjected to a continuous test of 93 days, and yielded 106 lbs. $12\frac{1}{2}$ oz. in the first 31 days, 102 lbs. for the second 31 days, and 102 lbs. $10\frac{1}{2}$ oz. for the third 31 days, making a total of 311 lbs. 7 oz. for 93 consecutive days, an average of 3 lbs. $5\frac{1}{2}$ oz. per day; this celebrated cow is again referred to below. In his report to the Dominion Minister of Agriculture, for the year 1884, Mr. John Smith, the Government Agent at Hamilton, Ontario, says that last year there was a large demand for Jerseys on American account, the Canadians having established for themselves a reputation superior to that of any other breeders, either in the States or upon the island of Jersey itself. The Canadian herds are noted for their fine forms, great substance, and grand constitutions, and, as butter-makers, stand unrivalled, having never been approached by those of any other country. At the head of the tribe are the great "Stoke Pogis," "Victor Hugo," and "St. Helier" families, a combination of whose blood has developed a typical family possessing wonderful prepotency, as exhibited by the public tests made by the American Jersey Cattle Club at Oaklands, in the herd of Mr. Valancey E. Fuller. Some of the following figures will, no doubt, astonish English readers:—

PRICES obtained in 1884 for JERSEY CATTLE from the HERD of
Mr. V. E. FULLER, OAKLANDS, HAMILTON, ONT.

	Total.	Average per Head.		
	£	£	s.	d.
Sale of eight cows	3,150	393	15	0
Sale of five bulls	3,180	636	0	0
Sale of eight bull calves	3,070	383	15	0
Sale of five heifers and heifer calves..	833	166	12	0
	£10,233	£393	11	6
Rent for services of five bulls	1,400	..		
	£11,633	..		

All the foregoing purchases were made for export to the United States. The bulls were likewise rented by American
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breeders, the lowest rental for the season being 100*l.*, and the highest 500*l.*, for "Prince Pogis," a son of "Mary Ann," the service being limited to five cows. In addition to the Oaklands sales, American buyers have purchased freely from other Canadian herds rich in the blood of the St. Lamberts family, Mr. George Smith, of Grimsby, Ont., having obtained 1000*l.* for a "Stoke Pogis" and "Victor Hugo" cow. The following extraordinary figures were obtained in official tests made on the Oaklands Farm, in 1884, by the American Jersey Cattle Club, as mentioned above:—

Name of Cow.	Quantity of Butter produced by each Cow in Seven consecutive days.	
	lbs.	oz.
Mary Ann of St. Lamberts	36	12½
Ida of St. Lamberts	30	2½
Mermaid of St. Lamberts	25	13½
Naiad of St. Lamberts	22	2½
Niobe of St. Lamberts	21	9½
Total	136 lbs.	8 oz.

This gives the remarkable average of 27 lbs. 5 oz. of butter per cow per week. These figures are official, and I take upon myself no responsibility in reproducing them; I am unable to state what treatment the cows received before being submitted to the test, what was the condition of their health at the time, or what yields they gave in the weeks preceding or following the one recorded.

The Holstein or Dutch Friesian cattle are beginning to attract considerable notice, and some authorities incline to the opinion that these ponderous animals may ere long prove to be serious rivals to the Jerseys. The principal breeders and importers are Messrs. Lord, Cook and Son, of Aultsville, Ontario.

Professor Brown, in a letter to the Select Agricultural Committee of the Dominion House of Commons, maintains that one of the chief disadvantages Canadian stock-keepers labour under is the want of better pasture, and he advocates the establishment of permanent pasture such as has been formed at the Ontario Experimental Farm, and which is able to keep one and one-fourth beast per acre, while three acres of the ordinary kind are required for the support of one beast. There is further a need of better tree-shelter, a want of a greater number of pure-bred males, and a lack of knowledge of the adaptability of different breeds to the various conditions throughout the Dominion. Professor Brown is quite satisfied as to the suitability of different parts of the Dominion, both in the Eastern Provinces and in the North-West Territories, to the production of mutton and wool on a large and cheap scale.

Store Cattle for England.—The proposal to send store cattle over to England that they may be fattened in this country must not be overlooked. The subject has been discussed somewhat fully in the Canadian press by Professor Brown, who writes on the assumption that a market should exist for graded Shorthorn, Hereford, Aberdeen Poll, or Galloway steers, scaling 1000 lbs. to 1100 lbs., to be delivered in Liverpool or Glasgow, and fit for fattening off in six months. In Ontario they cannot produce a store steer weighing 1050 lbs. when 18 or 20 months old at less than 8*l.*, and one halfpenny per pound more would be required to make a certain profit, so that stores could not pass into shippers' hands at less than 10*l.* per head. Experience shows that it costs 4*l.* per head to send cattle across the Atlantic and land them at British ports, and, presuming the steers on arrival to be worth 16*l.* per head, this leaves a margin of 2*l.* profit to the parties who take all the risk. Then the question arises as to whether it would better pay the Canadian farmer to export his cattle as stores, or as ready for the butcher seven months later. In the latter case, instead of selling the animal as a store in September or October at 10*l.*, it is stall-fed up to May in such a way as to go out at 1400 lbs., worth, for export, not more than 3*d.* per pound live-weight. Its value is then 17*l.* 10*s.* to the feeder, or 75 per cent. more than the store price; but to effect this there has been an absolute cash outlay of 7*l.* 10*s.*, which reduces the value to 10*l.*, or actually no more than could have been secured seven months previously. It is concluded, therefore, that selling stores would be the more profitable, as the cattle would be converted into money seven months earlier, there would be greater inducement to stock-breeding, while more and better pasture would be brought into existence to promote cheap production. On the other hand, the loss of manure from the exported stores is not to be overlooked; nevertheless the opinion seems to be that the sale of stores to Britain would be highly beneficial to Canadian stock-farming, and Professor Brown maintains that the goal they ought to aim at should be to increase the exportation of beeves to 100,000, and at the same time to send Britain 50,000 stores per annum.

THE DAIRY INDUSTRY IN CANADA.

The unmistakable growth in the dairy industry at home during recent years has been reflected in a corresponding development elsewhere, and in no country more than in Canada. Professor S. M. Barré, of Montreal, whom I recently had the pleasure of meeting in Canada, has addressed to the Select Agricultural Committee of the Dominion House of Commons a

paper embodying his views as to the present position and the requirements of dairy farming in Canada; and his extensive knowledge of dairying as practised in various European countries, coupled with his practical experience in the management of the Provincial Creamery of Quebec, lends considerable authority to his opinions, which I shall briefly summarise.

Dairying is now the most productive agricultural industry in Canada. During the last few years the export of dairy produce has represented an annual value of 1,600,000*l*. For the year ending 30th June, 1883, Canada exported to England alone 57,672,959 lbs. of cheese and 6,230,173 lbs. of butter. As there is, presumably, both in England and on the continent of Europe, a large, constant, and steadily increasing market for Canadian cheese and butter, the possible development of the dairy industry in the Dominion is practically unlimited. Of agricultural industries, dairying is the one which yields the surest, most uniform, and most abundant results, and from both the agricultural and the commercial point of view is the one best suited to all the older Provinces.

Cheese-making is one of the best understood and most productive industries of the country. The average quality of the cheese of Ontario is superior to that of Quebec; and though the latter Province produces some cheese quite equal to the best Ontario makes, there is in both Provinces considerable room for improvement. For cheese-making, Ontario has carried off three first prizes in competition against the whole world, at international exhibitions; and though the Maritime Provinces, being nearer the sea-board, have greater facilities for export, they are yet behind the premier Province in the art of making cheese. In 1873 the export of cheese from Canada was only about 15,000,000 lbs., while for the entire year of 1883 it had risen to nearly 60,000,000 lbs. The leading defect in the cheese industry in the Province of Quebec is in the mode of packing, the boxes used not being suited to the purpose. The curing of the cheese is defective at the opening of the dairy season, at its close, and during the great heat of summer, and this is attributed to the fact that the factories are too slightly built, and are incapable of protecting the product from the influence of the atmosphere. The remedy suggested is to impart to a sufficient number of intelligent men the knowledge of the best style of cheese-making in Ontario, and to employ them as instructors, and as inspectors of cheese factories, wherever the manufacture is defective. Also, to diffuse by means of the press the knowledge requisite for the making of good cheese, and for the establishment of efficient cheese factories.

Butter-making is much less advanced than cheese-making. The cheese industry got the start some fifteen years ago by the establishment of co-operative or public cheese factories, and it is only recently that attention has been directed to the institution of public creameries. Moreover, the principles which govern cheese-making were early studied by such skilful manufacturers as Mr. Ballantyne, of Stratford-on-Avon, Ont., and others, and a knowledge of the art rapidly spread. The success which ensued, and the high price of cheese some years ago, induced farmers, particularly in Ontario, to devote themselves to cheese-making. Among other adverse influences checking the development of the butter industry were the inefficiency of the appliances, the want of the necessary knowledge for an intelligent prosecution of the industry, the absence of methods specially adapted to the circumstances and requirements of the country, and the poor reputation of Canadian butter on foreign markets. The Provincial Government of Quebec having taken the matter up, that Province is now ahead of Ontario in the quality of its butter. The census of 1881 returns the production of home-made butter in Canada as 102,000,000 lbs., from 3,000,000 to 4,000,000 lbs. being the output of creameries. The total export of butter for the year ending 30th June, 1880, amounted to 19,887,703 lbs., and for the year ending 30th June, 1883, to 8,106,447 lbs., thus showing a decrease of 11,781,256 lbs. The average price of butter in Canada may be put at 9*d.* per lb., but it varies from 7½*d.* or 8*d.* west of Toronto, to 11*d.* at the creameries. Taking the average price of Danish butter on the English market at 15*d.* to 17*d.* per lb., it is thought that though Canadian butter would not command so high a price as Danish, yet by improvements in manufacture and in means of transport, the average price of the Canadian product might be increased by at least 3*d.* per lb.; and an increase in the price would bring about a considerable increase in the production. The defective butter-making of most Canadian farmers, especially those who have only a small number of cows, is due to want of knowledge of the process and to lack of time. The ordinary occupations of a farmer's wife are too numerous and too varied to permit of her giving the requisite time and care to butter-making, and the cost of hired labour is too great for any relief to be obtained from this source; hence the making of good butter for export is an impossibility on seven-eighths of Canadian dairy farms. The remedies suggested are to diffuse sound knowledge as to butter-making by pamphlets and other means, and to establish public dairies or creameries. Then, again, the butter that is made cannot be relied upon for uniformity of quality, and this is due

to the absence of uniformity in the methods of making and in the generally accepted principles ; moreover, the butter is too frequently made by inexperienced persons who possess neither skill nor taste for the work. It is believed that this defect might be lessened by the adoption of methods specially suited to the requirements of the country, and by the inculcation of one sole theory, scientifically studied and practically tested by intelligent disinterested men, at an experimental station. It is not generally known that two kinds of butter are made in Canada, both considered of first quality but each serving a different purpose. The one has a very marked flavour, as French and American butter, and keeps for a shorter time ; the other has a less pronounced flavour, as the Dominion butter, but keeps longer. The latter kind is in every way the better suited to Canada, where the dairying season lasts only seven months of the year, and it is, of course, only this kind which is properly suited to foreign export. Here, again, the desirability of an experimental station is insisted on, as it is believed that this would constitute the best means of diffusing a knowledge of making butter with long-keeping properties. Another difficulty presents itself when Canadian butter is brought into competition with other butter on foreign markets, and this arises from the fact that dairy farmers in Canada hold their butter too long a time. Thus, while the French, as a rule, send their butter to England eight or ten days after it is made, the Germans within a fortnight, and the Danes within three or four weeks of its production, Canadian butter often remains four, five, six, and even eight months in the farmers' hands. A remedy is once more suggested in the establishment of creameries, the existence of which would, owing to the quantity of butter made, render it possible to effect weekly shipments, a proceeding which is out of the question when the butter is only made in small quantities by each farmer. Supposing the article to be shipped from the factory weekly, and allowing two weeks for the Atlantic voyage, and an interval of another week before the consumer is reached, there is then nothing to prevent Canadian butter being in the hands of the consumer within four or five weeks of the time of its production.

From what has been said, it is abundantly evident that, in order to improve the quality of Canadian butter, to ensure uniformity in the product, and to facilitate immediate shipment to foreign markets, Professor Barré advocates the general establishment of butter factories, as the most powerful lever that could be brought to bear on the development of the butter industry. But to make these factories a commercial success,

a staff of skilful and experienced dairymen is a necessity, and the only way to get such men is to educate them, and for this object the establishment of dairy schools throughout the country is advocated. Further, to teach butter-making in such schools, there must be a definite theory of the process, scientifically studied and practically worked out, and this, it is maintained, involves the establishment of an experimental dairy station of the kind at present existing in large numbers on the continent of Europe. The theory studied at the experimental station would be taught in the dairy schools, practised in the butter factories, and so be the means of diffusing a sound practical knowledge of butter-making amongst the farmers in general. In short, the system of teaching, both theoretical and practical, which is advocated, is similar to that which is in operation in Denmark.

Professor Arnold, of Rochester, New York State, who has devoted his life to the study of dairying, and whose name is well known on this side of the Atlantic, gave some exceedingly valuable evidence before the Select Committee. He attributes the defects in cheese-making in Canada to a want of skill on the part of the manufacturers, and to a deficiency in the quality of the rennet. Notwithstanding the appreciation in which Canadian cheese is held on the English market, there is not 5 per cent. of it equal to what it might be; the difference in price, however, is no criterion of the difference in merit, for poor cheese is sold at a higher, and good cheese at a lower, rate than its true value. In Professor Arnold's own district efforts are being made to overcome the drawback associated with inferior rennet, but they make only slow progress. Numerous establishments are supplied with perfectly pure "liquid pepsine," free from any other animal matter. It is distributed by the quart or the gallon to the dairymen, as they prefer. In the preparation of rennet, manufacturers are apt to get it tainted, and it will even undergo putrefaction, in which condition it injures the quality of the cheese very materially. The stuff used by some of the dairymen in Canada and the States is surprising, and four inspectors reported that they found 75 per cent. of the factories they visited using rennet that was actually putrid, while the rest were using good material or rennet extract. As the extract costs a little more than the raw stomach, its introduction progresses but slowly. The Government might help to improve matters if they would find funds to enable the dairymen's associations to pay in part for the extract, so that the dairymen could procure it as cheaply as they get the rennet. The dairymen would prefer the extract, because it saves them a great deal of labour, and is not such a

nasty mess to manipulate as the rennet is. The main cause of sourness in cheese arises from letting the curd lie in the whey while it is hardening, until the whey gets sour. The acid then counteracts the effect of the rennet ferments, which should cure the cheese, and as a consequence the cheese does not cure.

With regard to butter-making, Professor Arnold is of opinion that Canada is losing fully 1,000,000*l.* per annum through defective methods, chiefly want of care in the management of the milk, especially in setting it to obtain the cream, and in the manipulation during the making of butter. The more extended the use of machinery becomes the better, as it will leave less to the skill and manipulation of the workman. Canadian butter does not fetch on the English market a lower price than American butter, the reason being that the Canadian export is mostly of the best grades, whereas the good American butter is all consumed in the States, and only the very lowest grades are exported. The American makers never export any butter that is worth more than 11*d.* per pound. The establishment of creameries is a step in the right direction; they help to educate dairy farmers, and they turn out an article whose uniform quality goes a long way towards marketing it. In a sparsely populated country creameries are distinctly advantageous because the butter is all produced at centres where it can be most favourably sold. If a purchaser can go to a creamery and buy a thousand pounds of butter at once, he can afford to pay a better price than he could if he had to travel about and collect the same quantity; and the fact that the butter is all of one quality adds further to its value. Creameries are very successful in the States, not that there they make better butter than the private dairies, but they make all one quality. The creamery, however, does not divide the proceeds equally, as the milk is valued by the pound, so that rich milk from generously fed cows commands no better price than poor milk. In the States, creameries are the most prosperous, do the best business, and give the greatest satisfaction in the West, where butter-making is just being introduced. But in the East they are not now so much in vogue, as dairymen prefer to make their own butter at home, and so get better value from their milk. As regards the drying up of pastures in the summer, Canada does not suffer so much as the United States, there being more summer rain in the former country, so that in the northern parts of Canada the grass remains fresh and green through most of the summer. In the States it gets very dry, especially in the West, where the middle of the season is marked by a long dry spell, so that cattle lack both food and drink; and when they are once allowed to run down, the quantity of milk is reduced,

and the former flow is not recovered even if the cows are well supplied with food afterwards. The cultivation of peas, oats, millet, green corn, or some other succulent food, is recommended to make good the defect in the pastures during summer.

Some important features in the commercial aspects of Canadian dairying were brought forward in a valuable paper, read before the Western Dairymen's Convention, at London, Ontario, on the 14th of February, 1884, by Mr. E. A. Barnard, Director of Agriculture in the Department of Agriculture and Public Works, Quebec. In 1858 the exports of cheese were purely nominal, but since then there has been an almost continuous increase down to 1883, in which year the largest export took place. The history of the butter trade is very different. In 1862, before confederation, the united Provinces of Ontario and Quebec (Upper and Lower Canada) exported more butter than the whole confederation of Canada does now, the exports for 1883 and 1884 having been less than that for 1862, though it must be admitted that 1883 and 1884 were exceptionally bad years. The following figures, taken from the Trade and Navigation Returns, show that the butter trade has been practically at a standstill since 1871:—

TOTAL EXPORTATIONS of CHEESE and BUTTER from CANADA.

Cheese.		Year.	Butter.	
Lbs.	Value.		Lbs.	Value.
	£			£
13,104	300	1858	3,721,200	96,142
36,156	933	1859	3,750,296	105,259
124,320	3,240	1860	5,512,500	158,524
294,336	4,787	1861	7,275,426	168,329
491,680	9,845	1862	8,905,578	226,554
974,736	24,700	1866	10,448,789	418,854
..	..	1867	10,817,918	348,258
1,577,072	38,711	1868	9,956,448	317,545
6,111,482	143,589	1869	10,853,268	468,454
5,827,782	134,897	1870	12,259,887	470,714
8,271,459	221,981	1871	15,439,266	613,046
16,424,025	368,057	1872	10,068,448	722,536
15,208,633	456,082	1873	15,205,663	641,796
24,050,982	704,640	1874	12,233,046	524,061
32,342,030	777,245	1875	9,268,044	467,465
37,885,286	810,001	1876	12,392,367	515,886
37,700,921	779,593	1877	15,479,550	644,996
39,371,139	824,260	1878	13,504,117	494,839
49,616,415	806,950	1879	14,536,246	427,689
43,441,112	818,809	1880	19,887,703	623,832
54,713,020	1,218,307	1881	17,820,278	722,378
55,325,167	1,195,907	1882	15,388,488	595,034
58,041,887	1,290,380	1883	8,106,447	341,165
75,835,557	1,564,724	1884	8,473,976	334,953

TABLE showing the EXPORTS of CHEESE and BUTTER from CANADA to the UNITED KINGDOM for the NINE YEARS, from 1876 to 1884, inclusive.

(From the Trade and Navigation Returns.)

Cheese.		Year.	Butter.	
Lbs.	Value.		Lbs.	Value.
	£			£
33,927,697	727,926	1876	9,430,712	395,181
33,659,159	689,462	1877	12,997,380	549,326
36,331,358	760,329	1878	11,031,366	409,768
43,959,028	717,863	1879	12,656,567	378,322
39,153,726	754,554	1880	16,687,978	551,213
48,913,873	1,094,272	1881	16,282,376	666,682
50,555,644	1,094,835	1882	11,183,746	439,025
57,672,959	1,281,971	1883	6,230,173	266,117
69,338,074	1,441,485	1884	6,889,713	279,130

The unsatisfactory condition of the butter industry is considered due to the fact that at present it apparently pays better to make cheese, and that the unsteadiness of the demand for Canadian butter also operates adversely. The export market for Canadian butter is undoubtedly Great Britain, as 80 per cent. of the export is absorbed in this country. But England wants the best brands only; and while the highest grades of imported butter are quoted in England at from 120s. to 144s. per cwt., Canadian and even American brands can only command from 60s. to 122s. Canadian dairy practices compare most unfavourably with those of Denmark,* and while the Canadian butter trade with England has stood still and even undergone retrogression since 1872, the exports of Danish butter to the English market have steadily increased by nearly 100 per cent. during the same period. The yearly export from Holland, again, to the English market has increased since 1872 nearly 200 per cent., and, however much this may be due to oleo-margarine, the Dutch produce is quoted at much higher figures than the Canadian. So with the United States, while the Canadian export was at a standstill, that from the States increased nine-fold in the six years 1874 to 1879. These facts place the very poor quality of Canadian butter beyond dispute, and the largest exporters of butter in Montreal estimate the character of the output thus: finest Canadian butter, 5 to 10 per cent.; fine ditto, 25 to 30 per cent.; poor ditto, 50 to 60 per cent. While Canadian farmers think cheese-making pays better than butter-making, the contrary seems to be the ex-

* See the paper on "Dairying in Denmark," by H. M. Jenkins, F.G.S., in this 'Journal,' Second Series, vol. xix. 1883, p. 155.

perience of Denmark and Holland; in these countries butter is the principal industry, and such cheese as is made comes from milk more or less skimmed, and, in the case of Holland, for example, the quantity shipped to England and the prices obtained for such skim cheese compare most favourably with the Canadian exportations of whole-milk cheese.

An important economical question arises whether it would be prudent to increase very largely the production of Cheddar cheese—the only kind made in Canada, as a rule—over what it is at present. That such an increase, even at the rate of ten-fold in a very few years, is practicable there can be no doubt. Thus, in the Province of Quebec alone, not a single cheese factory existed in the French settlements up to 1872, and now these same settlements produce nearly one-fourth of all the cheese manufactured in Canada, and there is still room for an increase of a hundred-fold. From the Maritime Provinces, where the facilities for making butter and cheese are at least equal to those of Quebec, hardly any cheese is exported. The following Table, from the Trade and Navigation Returns, 1883, is interesting, as it conveys a good idea of the present exporting capacity of the several Provinces named:—

TOTAL EXPORT OF CHEESE AND BUTTER from the CANADIAN PROVINCES in 1883.

Cheese.		Province.	Butter.	
Lbs.	Value.		Lbs.	Value.
	£			£
12,365,079	276,200	Ontario	1,537,586	65,455
45,655,038	1,013,636	Quebec	6,048,912	255,680
15,081	418	Nova Scotia	477,372	18,272
135	3	New Brunswick	20,199	899
12	$\frac{1}{2}$	British Columbia	67	6
6,042	123	Prince Edward Island ..	22,311	853
58,041,387	£1,290,380 $\frac{1}{2}$		8,106,447	£341,165

But the imports of cheese into Britain during the last few years do not show that increase which would seem to call for an increased export from Canada. Our imports of cheese from all sources were, in—

	cwts.
1879	1,789,168
1880	1,773,503
1881	1,834,480
1882	1,692,495
1883	1,797,080
1884	1,926,070

Hence, if the present tendency towards increasing the output of cheese in Canada continues, the surplus can only be disposed

of on the English market by its being able to outrival the American cheese with which it is in competition.

It has been shown that, when every element is considered, and in a series of years, butter-making pays the Canadian farmer fully as well as cheese-making. One hundred pounds of standard milk will make, in Ontario, $9\frac{1}{2}$ lbs. of cheese, or 4 lbs. of butter; whey is considered of little account, being valued at about $2\frac{1}{2}d.$ per 100 lbs. Hence, we get—

										s.	d.
$9\frac{1}{2}$ lbs. cheese, at say $5d.$ net, a high average	..	..	..	..	..	..	..	..	..	3	$11\frac{1}{2}$
Whey	..	..	..	..	..	..	..	..	..	0	$2\frac{1}{2}$
Total										4	2
4 lbs. butter at $10d.$ net	..	..	..	..	..	..	..	..	..	3	4
Skim-milk	..	..	..	..	..	..	..	..	..	0	10
Total										4	2

And since, in calf feeding or pig raising, sweet skim-milk is worth one-half of the whole-milk, $10d.$ is less than the real value to a careful farmer; and it has been shown in some of the Government experimental stations in the United States that, under proper care, 100 lbs. of skim-milk will produce $6\frac{1}{2}$ lbs. of pork, live-weight.

As regards future markets for butter, Canadian dairy farmers rely upon the home demand, which is expected to increase many fold when really good butter becomes as common as it is now scarce; then there is the English market, where the *best* butter is always in request; and there are, further, all the markets of the world, which the United States are now opening up for Canada as well as for themselves. Only about two-thirds of the United States exports in butter reach Britain; and even the Dominion imports upwards of 250,000 lbs. from this source, irrespective of more than half a million pounds sent from the States into Newfoundland, Labrador, Miquelon, and St. Pierre, which would evidently derive their supply from Canada, were Canada able to provide it. The fact that the well-known butter manufacturer, Mr. Valancey Fuller, of Hamilton, Ontario, has shown how to produce 850 lbs. butter in a year, worth $1s.$ per pound, from a cow weighing about 1000 lb. live-weight, on no more food than it would take to produce 750 lbs. of matured beef, live-weight, in the same time, and worth $2\frac{1}{2}d.$ per pound, distinctly indicates on which side the profit lies when dairying and meat raising are pitted against each other in Eastern Canada.

Messrs. A. A. Ayer and Co., Montreal, the largest exporters of butter and cheese from Canada, and perhaps from the American continent, are of opinion that the Government can best promote the increased production and better quality of cheese by employ-

ing skilled makers of cheese to visit the various factories and give instruction. They believe that three skilled practical instructors in Ontario, and three in the Province of Quebec, engaged each at a salary not to exceed 200*l.* per annum, would result in a gain of from 10,000*l.* to 20,000*l.* to the country, and possibly twice this amount. The Dairymen's Association of Ontario have already got this matter in hand. The butter problem in Canada is a more difficult one than that of cheese, and large losses will probably be incurred by farmers and merchants during the period of transition from the practice of making butter on the farm to that of manufacturing it in the creameries. It is suggested that the Government might foster the butter industry by giving a bonus, of, say, 200*l.* to each butter factory or creamery that shall be established and worked under certain fixed regulations; for the present this might be limited to one factory in each county, and not more than one-fourth, or at the most one-third, of the counties in Ontario and Quebec are butter-making counties.

THE PROVINCE OF ONTARIO.

Ontario, the premier Province of Canada, in population, in wealth, and in progress, consists in its northern part of a well-watered forest region, and in its southern part—that, namely, which is bounded on the east and south by Lakes Ontario and Erie, and on the west by Lake Huron and Georgian Bay—of a fertile farming country. This latter, too, was once forest, as is testified by the numerous tree-stumps still left in the ground, between which the plough has to be guided in its devious course. Around many of the farm homesteads there is an air of comfort and prosperity, particularly in the south of the Province; but here, as everywhere else in Canada, the hedgerows which constitute so common and picturesque a feature in English rural scenery are not to be seen, their place being taken by the snake fences which, with their zigzag outline, determine the boundary between adjacent fields. By a recent decision of the Judicial Committee of the Privy Council, a tract of land 80,000 square miles in area, lying to the north and west of Lake Superior, has been added to Ontario, the area of which is now nearly 200,000 square miles. Toronto, the capital, and the seat of the Provincial Government, has a population of 102,000; Hamilton, 36,000; Ottawa, the administrative capital of the Dominion, 28,000; London, 20,000; Kingston, 15,000.

The Ontario Bureau of Industries was established in 1881, and its first work was to make a report of crop statistics, live-stock, &c., in 1882. Schedules of questions are circulated freely through the Province, and the Bureau issues an agricul-

tural report several times in the course of the season. Included in the information collected in 1882 were the following items: total area of land in farms, 19,622,429 acres, of which 10,218,631 acres were cleared. Value of farm land, 126,468,500*l.*; of buildings, 26,542,515*l.*; of implements, 7,405,963*l.*; and of live-stock, 16,108,144*l.*; making the total value of farm property, 176,525,122*l.* Besides the usual farm crops there were: of flax, 6157 acres; hops, 2051 acres; orchard and garden, 213,846 acres. In addition to 1,562,683 grade and native cattle, there were 23,619 thoroughbred cattle, namely, 15,385 Durhams, 1438 Devons, 841 Herefords, 270 Aberdeen Polls, 1189 Galloways, and 4496 Ayrshires. The cheese factories in the Province numbered 471, and returns from 306 of these showed that 25,562,431 lbs. cheese were made, valued at 553,417*l.* The extent to which underdraining was being carried on was shown by the fact that one-third of the tile-yards in the Province from which returns were received made enough tiles in 1882 to lay more than 1000 miles of drains.

The average rent per acre of leased farms in 1884 was 11*s.*, the figures ranging as low as 4*s.* 1*d.* in Muskoka county and as high as 14*s.* 4*d.* in Durham county. The average wages of farm hands per year with board were 33*l.* 8*s.*, the minimum being 29*l.* 12*s.* in Welland county, and the maximum 39*l.* 4*s.* in Algoma county. The average wages per year without board were 51*l.* 8*s.*, ranging from 43*l.* 12*s.* in Parry Sound county to 61*l.* 12*s.* in Algoma county. Monthly wages with board averaged 3*l.* 18*s.*, the lowest being 3*l.* 10*s.* in Brant county, and the highest 4*l.* 15*s.* in Algoma county. Monthly wages without board averaged 5*l.* 16*s.*, ranging from 5*l.* 2*s.* in Prince Edward county to 6*l.* 12*s.* in Algoma county. During the first half of 1884 the average prices in the Province of the following agricultural produce per bushel were: fall wheat, 4*s.* 1*d.*; spring wheat, 4*s.* 2*d.*; barley, 2*s.* 6*d.*; oats, 1*s.* 9*d.*; peas, 3*s.*; rye, 2*s.* 6*d.*; Indian corn, 2*s.* 1*d.*; beans, 6*s.* 3*d.* On the Toronto live-stock market the average prices per cwt. were: for cattle, 1*l.*; calves, 2*l.*; sheep, 1*l.* 1*s.*; pigs, 1*l.* 7*s.* Professor Brown wrote me, under date of 19th December, 1884, "In Ontario markets at present store cattle fetch from 3½ to 4½ cents. per lb., weighing on an average about 900 lbs. Export cattle for the butcher are worth 5½ cents. on an average, tops 6 cents. For best Christmas beef 7 and 8 cents. are obtained, but the market is limited." Substitute the halfpenny for the cent. to get the English value.

The following Tables from the Agricultural Returns to the Bureau of Industry, August 1st, 1884, will convey a fair idea of the present condition of agriculture in the Province of Ontario:—

TABLE showing the AREA and PRODUCE of FARM CROPS in ONTARIO in 1883 and 1884.

	1883.		1884.	
	Acres.	Bushels.	Acres.	Bushels.
Fall Wheat	1,096,206	11,644,005	864,551	18,479,207
Spring Wheat	586,410	9,726,063	722,410	13,251,137
Barley	757,156	18,414,337	701,435	17,860,777
Oats	1,418,309	54,573,609	1,485,620	53,195,805
Rye	188,111	3,012,240	104,141	1,621,667
Peas	542,771	10,673,723	570,628	13,253,986
Indian Corn	214,237	..	174,834	..
Buckwheat	67,802	..	65,921	..
Beans	25,907	..	24,877	552,953
		Tons.		Tons.
Hay	2,350,969	4,115,535	2,193,369	3,044,912
Potatoes	166,823	..	168,862	..
Mangolds	17,219	..	18,314	..
Carrots	11,270	..	10,980	..
Turnips	98,429	..	104,108	..
Pasture	..	..	2,794,986	..

TABLE showing the NUMBER of LIVE STOCK in ONTARIO in 1883 and 1884.

	1883.	1884.
Horses	560,133	535,953
viz. Working Horses	349,552	303,474
Breeding Mares	87,380	93,910
Unbroken Horses	123,201	138,569
Cattle	1,818,054	1,925,670
viz. Working Oxen	17,071	16,793
Milch Cows	690,437	710,519
Store Cattle over 2 years	321,471	384,453
Young and other Cattle	789,075	813,905
Sheep	1,868,784	1,890,733
viz. Coarse Woolled:		
Over 1 year	1,043,080	994,608
Under 1 year	580,095	595,996
Fine Woolled:		
Over 1 year	150,281	176,341
Under 1 year	95,328	123,788
Pigs	906,727	916,158
viz. Over 1 year	245,996	257,711
Under 1 year	660,731	658,447
Poultry	5,847,344	6,237,606
viz. Turkeys	355,635	445,532
Geese	491,093	540,130
Other Fowls	5,000,616	5,251,944
	lbs.	lbs.
Wool, total clip	6,608,418	6,518,918

I have included wool in the foregoing Table, and may add that the average weight of the fleeces in 1884 was : coarse wool, 5.55 lbs. ; fine wool, 5.12 lbs.

The following Table of average yields of field crops in Ontario in 1883 and 1884 is also made up from the Agricultural Returns to the Bureau of Industry :—

	Bushels per Acre.			Bushels per Acre.	
	1883.	1884.		1883.	1884.
Fall Wheat	10.5	21.0	Buckwheat	25.2	..
Spring Wheat	16.7	20.0	Potatoes	96.3	..
Barley	24.7	25.0	Mangolds	361.0	..
Oats	39.0	36.0	Carrots	349.0	..
Rye	16.0	16.0	Turnips	298.0	..
Peas	19.8	24.0		Tons.	Tons.
Beans	20.7	22.0	Hay and Clover ..	1.75	1.50

Although it is only about twenty years since the first herd of thoroughbred Shorthorns reached Canada, the improvement which has taken place in the cattle of the Dominion since then is very marked, and nowhere more so than in Ontario, where the business of raising and feeding stock for the market has led to necessary and considerable modifications in the primitive style of agriculture which formerly prevailed there. In face of the vast wheatfields now opening up in the West, the premier Province will have to take a second place in the extensive and cheap production of cereals, and to turn more attention to the development of stock-breeding and dairy-farming. On some of the older farms the limits of the unaided fertility of the soil have been reached, and even exceeded, so that the subject of fertilisers is now exercising the minds of the leading agriculturists of the Province. Professor J. T. Bell, of Albert College, Belleville, writes : "The fertiliser in general use is barnyard-manure, much of which loses most of its efficacy by being allowed to lie for months in the open, exposed to the action of the sun and rain, which alternately vaporise the volatile and dissolve out the soluble parts, until only the *caput mortuum* of the dunghill remains. There is also a deficient supply of artificial manures." Professor Brown, on the other hand, writes that the result of experiments on the use of apatite, gypsum, and other fertilisers "goes to establish what might be matter of gratification to the country—that its wonderfully fertile climate, in conjunction with system and the best management and use of farmyard-manure, renders the extensive use of special fertilisers comparatively valueless. I am aware

that such an opinion will be challenged." At a meeting of farmers held at Belleville on 13th March, 1884, it was resolved to report to the Select Agricultural Committee that the following are among the present deficiencies of Ontario farming: "Want of proper drainage, especially subsoil drainage. Want of care in preparing and applying barnyard-manure. Absence of artificial manures. Neglect to extirpate weeds. Root-growing discouraged by the scarcity and high price of labour. The breeds of sheep and cattle should be improved by the importation of high-class animals. A systematic and uniform mode of butter-making is the great want. The cultivation of such fruits as are most suitable for exportation ought to be encouraged."

That branch of dairying which is concerned with cheese-making is an undoubted success in Ontario, a success attributable to the development of the factory system. Each factory is usually conducted on the co-operative principle; the milk is collected by a waggon sent round from the factory, tested by a lactometer to ascertain if it is of standard quality, and each farmer credited with the quantity supplied. The returns, less expenses, are divided among the contributors, or "patrons." The interests of the dairy industry are carefully fostered by two incorporated Dairymen's Associations in the eastern and western sections of the Province respectively, and regular cheese-markets are established at various centres. In 1882, the returns made to the Government from 266 factories gave 85,226 as the number of cows whose milk was supplied; and the average return to each patron, of whom there were 13,349, was 33*l.*, while the average value of cheese per cow was 5*l.* An average made up from 306 factories gave 10.6 lbs. milk (say 1 gallon) to 1 lb. cheese, the cheese being valued at 5*d.* per lb. The standard yield of milk per cow was 3000 lbs. (say 300 gallons). Only sixteen creameries were in operation in 1882; in two of them 24,822 inches of cream produced 23,411 lbs. of butter, and in two others 1,753,241 lbs. of milk yielded 64,807 lbs. of butter, equivalent to 27 lbs. milk to 1 lb. butter. The total quantity of butter made in the Province, chiefly at farmhouses, was in 1882, 306,567 cwt., and in 1883, 293,252 cwt.

Under the sunny sky of southern Ontario, where the small but graceful humming-birds have their summer home, fruit-culture is practised on a large and successful scale. Nearly 100 varieties of apples are cultivated, besides crab-apples, pears, plums, peaches, and grapes. Unfortunately, nearly all the apples that reach the English market from across the Atlantic are classed as American apples, whereas the general

character of the American product is somewhat inferior to that of the Canadian. The crisp flesh, copious juice, and fine flavour of a Canadian russet, or of a Nova Scotian Gravenstein, are in marked contrast to the dry texture and insipid flavour of very many of the American varieties. Apples form the great bulk of the green fruit exported from Canada; this is a rapidly extending industry, for in 1869 the value of this export was less than 5000*l.*, whereas a dozen years later it exceeded 100,000*l.* The peaches are delicious, if I may judge by some I purchased near Niagara at the rate of two a penny. Peach orchards, containing from 3000 to 10,000 trees, are common. The summer trade in strawberries is enormous; they are delivered in shiploads at the lake-ports. The culture of grapes is increasing, and the largest vineyards are in the counties of Wentworth, Welland, Lincoln, Kent, and Essex. The manufacture of wine from the grape is a growing industry.

The southern part of the Province, embracing an area of about 25,000,000 acres, is highly favoured, both in its climate and in its soils. Mr. John Carnegie, of Peterborough, Ont., has pointed out that the last Census Returns of Canada and the United States show that, when compared with the seven largest producing States, in each of seven cereals, Ontario, notwithstanding that she is thus brought into competition with twenty-two States, secures a first place as a producer of barley, of peas, and of beans; a third place as a producer of oats and of buckwheat; a fifth for rye; a sixth for yield per acre, and an eighth for quantity, of wheat; thus obtaining an honourable position in six out of the seven—a position not attained by any State of the Union—while the great State of Illinois only obtains three first places and a second, and then disappears from the comparison altogether.

The Hon. D. A. Wells makes the following statement regarding Southern Ontario:—

“North of Lakes Erie and Ontario, east of Lake Huron, south of the forty-sixth parallel, and included within the Dominion of Canada, there is as fair a country as exists on the American continent—nearly as large in area as New York, Pennsylvania, and Ohio combined, and equal if not superior as a whole to those States in agricultural capacity. It is the natural habitat on this continent of the combing-wool sheep, without a full, cheap, and reliable supply of the wool of which species the great worsted manufacturing industries of the country cannot prosper, or, we should rather say, exist. It is the region where grows the finest barley, which the brewing interests of the United States must have if it ever expects to rival Great Britain in its present annual export of over eleven million dollars' worth of malt products. It raises and grazes the finest cattle, with qualities especially desirable to make good the deterioration of stock in other sections, and its climatic conditions, created by an almost encirclement of the Great Lakes, especially fit it to grow men.”

Ontario is the only province in the Dominion which supplies a definite course of technical instruction in agriculture, the Ontario Agricultural College, at Guelph, being the solitary institution of its kind in Canada. The college provides a general commercial and English education combined with technical training in agriculture. The building is commodious, well situated, and furnished with lecture-rooms, laboratories, museum, and sleeping apartments for the students. The college has been in operation for ten years, and is in a most flourishing condition. It is fortunate in having for its President Professor James Mills, M.A., who possesses a wide and comprehensive grasp of the principles which should guide the course of an institution of so much public importance, and whose untiring devotion to the objects for which the college was established is amply reflected in the support it receives from the people not only of Ontario but of other parts of the Dominion. The technical curriculum embraces all the subjects necessary to a right understanding of the theory and practice of agriculture.

Attached to the college is the Ontario Experimental Farm, which, under the management of Professor Brown, who so ably fills the Chair of Agriculture in the college, and who has worked arduously and successfully for the land of his adoption, has been productive of results of the highest value and importance to Canadian agriculture, and such as have amply justified the outlay which the Provincial Government incurs in the maintenance of the college and the farm.

As the technical instruction of intending farmers and colonists is a subject that seems to possess a perennial interest in England, I may here introduce a few observations on the outlay, actual or estimated, in State-supported institutions in Canada. The Manitoba Department of Agriculture, in discussing the desirability of establishing in the prairie province a School of Agriculture and an experimental farm, says in its report :

"It has been urged upon the Department that such an institution could easily be made self-supporting. The experience of the agricultural colleges in the United States does not justify this assumption, nor does the result in Ontario, where the expenditure on the School of Agriculture at Guelph, in 1881, was 8145*l.*, the total receipts being 3074*l.*, leaving a loss of 5071*l.*, without reckoning interest on the cost of the farm, and of the valuable buildings which have been erected on it. Were the public lands in the Province under the control of this Government, it might be practicable to take steps for the establishment of a school, but in the present position of the public domain, it may not be considered advisable to incur the requisite outlay. Under the provisions of the Dominion Lands Act of 1879, the Dominion Government is given power to grant land not exceeding in extent 960 acres to any person or persons who will establish and keep in operation

thereon for a term of not less than five years a school of instruction in practical farming and all matters pertaining thereto, adapted for thirty pupils, with the approval and to the satisfaction of the Minister of the Interior. In a scheme of this nature there is ample scope for private enterprise with a reasonable certainty of profit, as an institution of that nature could no doubt be conducted more economically under private management than under public control . . . Such a school, established on sound principles, might, if placed under the supervision of this Department, become entitled to some bonus or other aid from the Province, but further than this it does not seem practical at present to suggest. The public lands in the Province are being so rapidly taken up, that persons desirous of establishing a school should lose no time in making a start."

To the Select Agricultural Committee of the Dominion House of Commons appointed last year, Professor Brown presented the following estimates :—

ESTIMATE OF ANNUAL MAINTENANCE OF AN AGRICULTURAL COLLEGE and EXPERIMENTAL FARM.

THE AGRICULTURAL COLLEGE.			
Dr.		Cr.	
£		£	
Fees of 100 students,		Salaries of five teachers	1,300
at £10	£1,000	Management of college	240
Students' board charge,		Boarding-house management	380
at £15	1,500	Boarding-house expenses	2,100
	<u>2,500</u>	General repairs	600
Balance to debit	2,120		
	<u>£4,620</u>		<u>£4,620</u>

THE EXPERIMENTAL FARM (400 Acres Cultivated).

	£		£
Revenue from sale of Live-		Salaries of three foremen	} 420
stock, Wool, Grain, &c. ..	940	teachers	
		Wages of four ploughmen	288
		Wages of cattleman and shep-	} 160
		herd	
			868
		Special Manures, Seeds, Black-	
		smith, Harness, Fuel, Medi-	
Balance to debit	528	cine, Printing, Implement	
	£1,468	Repairs, &c.	600
			£1,468

The actual revenue and expenditure of the Ontario Agricultural College for the year 1882, as detailed in the President's Report, is summarised in the following statement :—

ONTARIO AGRICULTURAL COLLEGE, 1882.

Dr.

Cr.

INCOME.		£	EXPENDITURE.		£
Tuition fees	784		Salaries and wages	2,422	
Board	987		Food	1,952	
Supplemental Exam. fees ..	6		Household expenses	1,378	
			Advertising, Printing, &c. ..	160	
			Laboratory, Library, &c. ..	222	
Balance to debit	4,549		Water for college and farm ..	142	
	£6,276			£6,276	

Thus the maintenance of the college alone cost the Province 4549*l.* in 1882, while in 1883 a similar statement shows a deficiency of 5160*l.* to be provided by the Province, the corresponding sum in 1884 being 4506*l.* The students meet part of their expenses by the regular labour they perform on the farm,—3½ hours to 5 hours a day, and, in July and August, when there are no lectures, 9½ hours a day, at from 2*d.* to 5*d.* per hour, according to the value of the work as estimated by the farm superintendent or his foremen. Board, lodging, and light cost from 9*s.* to 10*s.* per week. The charges as thus reduced to a minimum are:—

1. "The entire cost to an Ontario farmer's son, able and willing, with considerable experience in farm work, is 10*l.* to 14*l.* a year for board, washing, and tuition.

2. "To an Ontario student without any previous knowledge of farming, 12*l.* to 15*l.* a year for board, washing, and tuition.

3. "To non-resident students (*i.e.* from outside Ontario), 15*l.* to 20*l.* a year for board, washing, and tuition."

The balance-sheet of the Experimental Farm does not appear in the annual report, but the following are the valuations of live-stock and implements on 31st December:—

		1883.	1884.
		£	£
Horses	470	465	
Cattle	1,000	6,296	
Sheep	35	1,054	
Pigs	130	108	
Implements	1,543	1,737	
	3,178	9,660	

The farm, comprising 550 acres, of which 400 are cleared, was purchased by the Provincial Government in 1873 for 15,000*l.* The total cost of land and buildings, furniture, live-

stock, implements, drainage, &c., to the end of 1880, amounted to 45,178*l*.

Did space permit, I should like to give a description of the two pleasant days I spent at this admirable institution under the courteous and instructive guidance of President Mills and Professor Brown, but I must content myself with a brief summary. The crops include wheat, barley, oats, peas, hay, roots, pasture, and green corn. I walked amongst a splendid field of Indian corn, ten or a dozen feet high, and just ready to cut for soiling. Besides the ordinary live-stock, the farm possesses high class pedigree representatives of ten breeds of cattle, and ten breeds of sheep, whose cost is included in the valuation for 1884. I have condensed into the Table on page 415 a summary of the cattle.

The sheep comprise: of Lincolns, one ram (30*l*.), and three ewes (10*l*. each), bred by Mr. R. Wright, Nocton Heath, Lincoln; Cotswolds, one ram (23*l*.), bred by Mr. R. Swanwick, Cirencester, one ram (30*l*.), bred by Messrs. Gillett, Kilkenny, Bampton, and five ewes (5*l*. each), bred by Messrs. Gillett; Leicesters, one ram (50*l*.), and six ewes (8*l*. 6*s*. 8*d*. each), bred by Mr. R. Wallace, Mauchlin, Ayrshire; Highland, one ram (10*l*.), and two ewes (2*l*. 10*s*. each), bred by Mr. J. Craig, Craigdarroch; Cheviots, one ram (10*l*.), and two ewes (2*l*. 10*s*. each), bred by Mr. W. Marshall, Merton Mains; Oxford Downs, two rams (20*l*. each), and six ewes (10*l*. each), bred by Mr. A. Brassey, Heythrop Park, Chipping Norton; Hampshire Downs, two rams (40*l*. and 35*l*.), and five ewes (6*l*. each), bred by Mr. W. Parsons, West Stratton, Micheldever; Shropshire Downs, two rams (65*l*. and 35*l*.), bred by Mr. J. Evans, Uffington, Shrewsbury, and one ram (10*l*.), and twenty ewes (5*l*. each), bred by Sir Henry Allsopp, Bart., Hindlip Hall, Worcestershire; Southdowns, two rams (52*l*. 10*s*. and 105*l*.), and five ewes (10*l*. 10*s*. each), bred by Lord Walsingham, Merton, Norfolk.

Merinos are to be added to the sheep, and Holsteins* to the cattle; but no provision is being made for Welsh or Kerry cattle, as they are not considered suitable for Canada. For the students of the college this splendid array of live-stock will possess all the educational value of a permanent agricultural show, and it is a great treat to walk through the houses and see the representatives of so many aristocratic families at one and the same time. The beneficent effect which such sires as "Strathglass," "Conqueror," "Rob Roy," and "Sir Leonard," will produce in the Province, is bound to make itself apparent in a few years' time.

* These are really Dutch (chiefly Friesland) cattle.—Ebr.

NAME.	DATE OF BIRTH.	BREEDER.	Cost.
SHORTHORNS,—			£
Sir Leonard, 45613 ..	Jan. 4, 1880	Mr. Hugh Aylmer, West Dereham ..	210
Rob Roy, 45484 ..	June 23, 1880	Mr. J. A. Gordon, Udale, N.B. ..	450
Mademoiselle	Jan. 13, 1878	Mr. W. Duthie, Collynie, Aberdeenshire	150
Beta	Sept. 9, 1879	Mr. Hugh Aylmer, West Dereham ..	210
Baroness Wild Eyes	Nov. 20, 1880	Mr. John Evans, Uffington, Shrewsbury	31 10s.
Princess Royal	Jan. 22, 1882	Mr. W. Duthie, Collynie, Aberdeenshire	200
HEREFORDS,—			
Conqueror, 7510 ..	Apr. 25, 1882	Mr. T. J. Carwardine, Stockton Bury	500
Bloomer	May 29, 1878	Mr. J. Hill, Church Stretton	105
Sunflower	Dec. 3, 1881	Her Majesty the Queen	85
Cronkhill Duchess 2nd	Mar. 8, 1882	Mr. J. Hill, Church Stretton	67
ABERDEEN-ANGUS			
POLLS,—			
Strathglass, 2357 ..	Mar. 19, 1882	Lord Tweedmouth, Guisachan, Inverness	500
Mavis 3rd of Mary- park, 5285	Apr. 1879 ..	Mr. J. Mackenzie, Lyne of Carron ..	52 10s.
Kyma	Mar. 11, 1880	{Mr. J. Strath, Cauldhame, Tarves, Aberdeen}	100
Sybil's Darling 2nd, 4611	Mar. 27, 1880	Mr. J. Argo, Cairdseat, Tarves	50
Minnie of Marypark, 5286	Apr. 1880 ..	Earl of Seafield	70 7s.
DEVONS,—			
Rose's Duke	Apr. 7, 1883	{Mr. W. Farthing, Stowey Court, Bridgewater}	45
Esmeralda, 4433 ..	1877	Mr. W. Smith, Whimble, Devon ..	60
GALLOWAYS,—			
Stanley 3rd of Drum- lanrig, 1793	Jan. 1, 1882	Duke of Buccleuch	100
Gem 2nd of Drum- lanrig, 4236	Jan. 18, 1882	Mr. J. Neilson, Kirkcubright, Dumfries	60
Berta of Drumlanrig, 4222	Feb. 27, 1882	Duke of Buccleuch	60
AYRESHIRE,—			
Campbell of Drum- lanrig, 462	Apr. 1882 ..	Duke of Buccleuch	42
Stately 3rd of Drum- lanrig, 863	Apr. 22, 1879	Do.	40
Sensation 2nd of Drumlanrig	June, 14, 1881	Do.	40
Peggie of Auchenbrain	Mar. 1882 ..	Mr. R. Wallace, Auchenbrain, Mauchlin	25
Jeanie of Auchenbrain	Apr. 1882 ..	Do. do.	25
GUERNSEYS,—			
Cetywayo, 37	May 12, 1882	Mr. J. Le Page, St. Saviour's, Guernsey	50
Ruth	May, 1882 ..	Mr. Ogier, St. Martin's, Guernsey ..	35
Goldleaf	Apr. 1881 ..	{Mr. De Garria, Fortavale Parish, Guernsey}	..
JERSEYS,—			
St. Mary's Boy, 535 ..	Feb. 10, 1883	{Mr. E. P. Du Feu, St. Mary's Parish, Jersey}	45
Beauty of the Mill ..	May 8, 1882	Mr. P. Le Conilliar, Grouville, Jersey	45
Rosie	May 8, 1885	Do. do.	45
Le Tocq's Princess ..	May, 1882 ..	Mr. J. H. Kent, St. Owen's, Jersey ..	45
WEST HIGHLAND,—			
Duke of Argyle ..	Apr. 1881 ..	{Presented by Mr. G. Whitfield, Rouge- ment, Quebec.	..

The experimental department of the farm provides for numerous cattle-feeding trials, investigations into the influence of food on dairy products, and a considerable variety of experimental field work, embracing the testing of different kinds of wheat, trials of fertilisers, thick and thin seeding, deep and shallow seeding, selection of grasses and clovers, establishment of permanent pasture, and rotations in cropping. The experimental plots are to be seen in a field of 24 acres divided into 180 plots of one-tenth acre each, and amongst the appliances are a rain gauge of one-thousandth of an acre area, six lysimeters, eight ground thermometers, the usual meteorological instruments, and a well-equipped analytical laboratory in the field. The plots are disposed in nine ranges. In the first the cropping is made up of cereals newly imported from England; the second is appropriated to testing nitrogen in three forms of combination, and in three ratios; the third, similarly testing phosphoric acid; the fourth, permanent pasture and turnips under three forms of manure; the fifth, green fodder crops and twenty varieties of grasses and clovers; the sixth, varieties of mangold with special fertilisers; the seventh is left blank; the eighth is devoted to trying peas from England; and the ninth to testing varieties of winter wheat and the suitability of trees.

Amongst so many inquiries, ensilage has not been overlooked. A common root cellar was, at an outlay of 5*l.* 10*s.*, properly cemented and converted into an air-tight silo in which green oats were stored. The silo was opened ninety days after its completion, and the fodder was found to be "one body of sweet, well-coloured, oat-stalks, leaves, and heads," possessing a temperature of about 70° Fahr. Twenty-eight tons of green oats were put in the silo, filling it to a depth of 10 feet; it was at once covered with 2-inch boards, 9 inches wide, and loaded with earth that gave a pressure of 1000 lbs. per square yard. The results of feeding this silage have not yet been published, but the following figures, which represent the full cost of filling the silo, may prove of interest; mowing, hauling, cutting, and packing were all accomplished within the space of three days:—

	£	s.	d.
Wear and tear of engine	0	12	0
Engine driver	0	18	0
Two teams hauling from field ($\frac{1}{4}$ mile)	2	10	0
Mower and team, one day	0	12	0
Field loaders	1	8	0
Feeding straw-cutter, two men	1	4	0
Men in silo, four	2	0	0
Carpenter	0	8	0
Total	£9	12	0

This represents an average cost of about 7s. per ton.*

To give some idea of the painstaking care with which Professor Brown discharges the duties of his office, I reproduce, on pages 418 and 419, two Tables referring respectively to cattle and sheep. Though English breeders may not be disposed to agree with the decisions in every case, they will nevertheless study the tables with interest. I may mention that in the case of cattle the 1000 maximum points of the "beef and milk" breeds are not to be considered as equivalent to the 1000 points in the two other cases. And in the case of sheep I have added the last column, to show which breed is estimated to stand highest in the respective points. Arranged in order of general excellence as indicated by the total marks, the sheep stand thus:—1. Southdown. 2. Hampshire Down. 3. Shropshire Down. 4. Oxford Down. 5. Leicester. 6. Cotswold. 7. Lincoln. 8. Merino. 9. Cheviot. It is worth noticing that while the Hampshire Downs do not obtain the highest mark under any point, they yet stand second on the general list.

The cost of producing beef is illustrated in the particulars issued by the Ontario Experimental Farm in conjunction with an announcement of the sale by auction of seven prime young steers a few days before Christmas last. Their average age was 2 years 4½ months, and average weight 1660 lbs. The following is stated to be the cost of production per head, though it would probably have been more correct had the value of the manure been deducted instead of that of the home-grown food:—

	£	s.	d.
FIRST YEAR, including calf value, milk and all other food, with attendance	8	0	0
SECOND YEAR, food and care	11	13	0
FOUR MONTHS OF THIRD YEAR	4	3	8
	£23	16	8
Less estimated market value of food grown on farm	8	13	8
Total actual cost of production	£15	3	0

This brings the cost to close upon 2½d. per lb. live-weight. At an exportation price of 3d., there would be a cash profit of 5l. per head on these cattle, and nearly double this is sometimes realised for Canadian Christmas beef. The food in the foregoing case consisted of hay, roots, green fodder, bran, peas, corn, oats, oil-cake, and Thorley condiment, averaging during winter of second year, 9 lbs. hay, 25 lbs. roots, 8 lbs. grain, and 2 lbs. cake per day.

* These figures may be compared with similar ones in the "Report on the Practice of Ensilage at Home and Abroad," by H. M. Jenkins, F.G.S., in this 'Journal,' Second series, vol. xx. 1884, p. 126 *et seq.*

STANDING OF LEADING BREEDS OF CATTLE AS RECOGNISED IN ONTARIO IN 1884.

STANDARD POINTS OF CATTLE.	Beef.					Beef and Milk.			Milk.			
	Maximum Value.	Shorthorn.	Hereford.	Aberdeen Poll.	Galloway.	Maximum Value.	Devon.	Northolk and Suffolk.	Maximum Value.	Dutch.	Ayrshire.	Jersey.
1. Early Maturity	200	200	180	195	125	140	130	140	75	75	60	55
2. Permanency of Character	100	80	90	68	100	85	85	70	70	68	65	70
3. Weight of Flesh	150	150	134	143	110	100	85	100	70	70	50	35
4. Constitution	50	40	50	36	46	50	45	50	50	50	48	30
5. Freedom from Disease	60	50	60	48	57	60	60	55	60	60	50	57
6. Impressive Power	40	40	35	35	33	40	40	25	40	40	38	35
7. Reliable Breeder	60	48	60	50	58	60	60	54	60	60	55	56
8. Hardiness	60	40	55	45	60	55	55	48	50	45	50	30
9. Quality of Flesh	30	18	22	24	30	25	20	25	20	18	20	18
10. Forager	40	27	37	30	40	40	40	37	40	34	40	27
11. Disposition	35	35	28	33	24	50	50	38	60	55	48	60
12. Good Mothers	25	20	25	21	23	25	25	20	25	23	19	25
13. Least Offal	20	17	20	18	20	15	13	15	10	10	9	8
14. Quantity of Milk	60	60	55	53	50	130	110	130	200	200	185	100
15. Quality of Milk	25	25	20	22	20	65	65	50	100	50	90	100
16. Cost of Production	45	42	45	44	36	40	35	40	40	40	35	28
17. Long Use	..	..	..	..	..	20	20	17	30	80	25	20
	1000	892	916	865	832	1000	938	914	1000	918	817	754

STANDING of LEADING BREEDS of SHEEP as recognised in ONTARIO in 1884.

STANDARD POINTS OF SHEEP.	Maximum Value.	Lincoln.	Cotswold.	Leicester.	Cheviot.	Oxford down.	Hampshire down.	Shropshire down.	South-down.	Merino.	HIGHEST.
1. Early Maturity	200	150	140	200	100	180	170	170	180	70	Leicester.
2. Weight of Fleece	150	150	140	130	60	135	130	125	80	100	Lincoln.
3. Permanency of Character	80	40	50	35	70	30	60	55	75	80	Merino.
4. Quality of Wool	70	40	37	48	30	50	60	58	65	70	Merino.
5. Weight of Flesh	50	50	45	40	28	38	35	33	25	20	Lincoln.
6. Constitution	50	25	40	40	33	45	35	30	50	20	Southdown.
7. Freedom from Disease	50	33	33	25	35	30	45	40	50	25	Southdown.
8. Impressive Power	40	20	25	35	25	15	30	27	40	33	Southdown.
9. Reliable Breeder	40	23	25	20	30	40	35	35	38	15	Oxford Down.
10. Hardiness	40	20	30	15	38	30	35	35	40	25	Southdown.
11. Quality of Flesh	30	15	18	12	25	22	28	28	30	10	Southdown.
12. Prolificness	30	18	20	15	15	30	25	25	28	10	Oxford Down.
13. Forager	30	15	18	10	30	20	23	23	25	25	Cheviot.
14. Disposition	20	12	10	18	8	20	15	15	13	7	Oxford Down.
15. Good Mothers	20	12	12	7	10	18	15	15	20	7	Southdown.
16. Least Offal	20	7	9	20	8	12	15	15	10	8	Leicester.
17. Length of Wool	20	7	8	10	10	12	15	15	18	20	Merino.
18. Uniform Fleeces	40	80	28	20	20	25	35	33	35	40	Merino.
19. Cost of Production	20	7	10	20	10	18	15	15	15	12	Leicester.
Total	1000	674	698	715	585	770	821	792	837	597	Total.

It is difficult to estimate the value of the good results that have emanated from the Ontario Agricultural College and Experimental Farm. Whatever these have been in the past, they are likely to be still greater in the future—in the years to come when the many students who have been trained at Guelph will have beneficially influenced the style and progress of farming throughout the length and breadth of the Dominion. The Ontario Government expends no money more advantageously than that which is applied to the maintenance of this useful and necessary institution.

THE PROVINCE OF QUEBEC.

Quebec, the oldest Province in Canada, extends for some hundreds of miles along both banks of the mighty St. Lawrence. Its northern boundary is the high land which constitutes the water-parting^t between the rivers flowing northwards into James Bay and Hudson's Bay, and those which flow southwards into the St. Lawrence. Its western boundary is determined mainly by the Ottawa River. Upon the south the Province is bounded by the parallel of 45° north latitude until it reaches New Hampshire, when, trending north-east, the boundary line follows a sinuous course till it terminates on the borders of New Brunswick. As the Atlantic steamers wend their way along the bosom of the majestic St. Lawrence, the traveller acquires a good idea not only of the immensity of this famous river, but also of the physical features of the Province of Quebec. On either bank he sees a broad alluvial plain clothed with forest trees down to the water's edge, except where extensive clearances have been made, and the background is effectively occupied by ranges of hills. Near the shores, and particularly on the south side, are to be seen the white houses of the old French settlers, sometimes aggregated into villages and towns, but more frequently dotted along in one straggling line for more than a hundred miles. Here and there the sombre hue of the woodlands is varied by the glittering spire of a Roman Catholic church, for the French Canadians have adhered to their faith, to their language, and it might almost be said to their farming. Of the 1,359,027 people who dwelt in the Province in 1881, no less than 1,073,820 were of French origin. More French is to be heard than English, and all the enactments of the Provincial Parliament, as well as all official notifications, appear side by side in French and English.

The Laurentian Mountains on the north, and the Adirondacks, Notre Dame, and Green Mountains on the south, are the most prominent features in the landscape. The valleys of

the Laurentians have been scooped out by innumerable streams which abound in fish, and their slopes are thickly covered with the timber which supplies the extensive lumbering trade of the Province, the value of the timber exports in 1883 having amounted to 2,105,990*l*.

The historic city of Quebec, the administrative capital of the Province, occupies a magnificent site, and has a population of 63,000. Montreal, the commercial capital, is 180 miles higher up the river, and has nearly 200,000 inhabitants. During winter the St. Lawrence is frozen over sufficiently to permit of traffic being carried on across it between the two sides of the river, and everybody has heard of the ice carnival at Montreal in February. "A visitor in winter is sure to be impressed with the weird scene in early morning or evening, when, from a sky as warm with rosy tints as in midsummer, the level beams of sunlight, glancing and brightening over the sea of quiet snowy furrows, and glittering icy crests, strike along the line of evergreens marking the ice roads, upon the trains of sleighs, and light up the tinned roofs and steeples of the distant city with brilliant splendour." And yet, such is the summer, that maize is a certain grain crop in nearly the whole of the Province. Spring wheat gives an average yield of about 10 bushels per acre, and, besides the ordinary crops of the farm, fruit is largely cultivated, especially in the south. Improved farms may be purchased at from 4*l*. to 6*l*. per acre, including dwelling-house, outbuildings, and fencing.

The following Tables are from the Census Returns of 1881 :—

Animals and their Products, Province of Quebec.

Horses	225,006
Colts and Fillies	48,846
Working Oxen	49,237
Milch Cows	490,977
Other Horned Cattle	490,119
Sheep	889,833
Swine	329,199
Cattle killed or sold	160,207
Sheep	436,336
Swine	333,159
Pounds of Wool	2,730,546
Pounds of Hay	559,024

As in the following figures the acreage is only given in one or two cases, I am unable to make up the average yields, but the numbers will serve to indicate the relative extent to which the various crops are cultivated :—

Field Products, Province of Quebec.

	Bushels.
Spring Wheat	1,999,815
Winter Wheat	19,819
Barley	1,751,539
Oats	10,990,205
Rye	430,242
Peas and Beans	4,170,456
Buckwheat	2,041,670
Indian Corn	888,169
Potatoes	14,873,287
Turnips	1,572,476
Other Roots	2,050,904
Grass and Clover Seed	119,306

And there were 1,614,906 tons of hay, the produce of 1,495,494 acres, the average being 1.08 tons per acre. As there were 224,678 acres in wheat, the yield shows the low average of 9 bushels per acre.

Farming in Quebec may be seen under two phases. There is the easy-going, comfortable, old-fashioned style of the French Canadians, very similar now, I imagine, to what it was a century ago; and there is the improved and progressive farming of the Eastern Townships. These comprise such towns as Richmond, Sherbrooke, Compton, and others in the south of the Province near the New England Boundary. They are mostly English, having been originally settled by the United Empire Loyalists, who left the United States at the time of their separation from England, making enormous sacrifices to preserve their allegiance. Besides Indian corn, tomatoes, grapes, and other delicate fruits are ripened in the open air. Grazing and stock-raising are, however, the special features in the farming of this area. The rich grasses of the hill-sides and the clear streams help to make it a good dairying country, and some of the best butter produced in the Dominion is made here, while the cheese is of excellent quality. Butter and cheese factories are largely on the increase in Quebec, no less than 400 new ones having been established in 1882. The Grand Trunk, Central Vermont, and other railways have opened up the townships for trade with Montreal and Quebec on the one side, and with the New England and New York States on the other, and these latter have taken great quantities of dairy produce in recent years. It is an admirable district for raising stock, as the celebrity of the Hon. M. H. Cochrane's pure-bred herds at Compton testifies. With their facilities for grazing cattle and sheep on their undulating lands, the farmers of the Eastern Townships are pushing their way to the front in order to secure

a share in the export cattle trade of the Dominion. The country is well wooded,—hard and soft maple, birch, elm, ash, basswood, butternut, hickory, cedar, and spruce being the chief trees.

Besides extensive beds of peat, the Province possesses immense deposits of apatite, in which a very large trade is growing up, the export from Montreal having reached 19,000 tons in 1883, and 20,000 tons in 1884, whereas in 1877 it did not amount to 6000 tons. The chief deposits are in Ottawa county, where, however, the mining of apatite was not commenced till 1875, since when the operations have steadily increased, and some of the phosphate lands have sold for as much as 250*l.* per acre. Raw Canadian phosphate will contain as much as 88 per cent. of tribasic phosphate of lime, and pure specimens of apatite contain about 92 per cent. Cargo samples analysed in England have yielded from 85 to 86 per cent. of tribasic phosphate, but the most usual average is from 75 to 80 per cent. Prices have fluctuated widely, ranging between 5*l.* 16*s.* and 3*l.* per ton of 80 per cent. quality. Low freights are sometimes obtained by ships taking apatite for ballast under timber cargoes, at from 2*s.* 6*d.* to 10*s.* per ton. As it is believed that much of the superphosphate exported from England to the United States,—7766 tons in 1883,—is worked up from raw phosphates imported from Canada, it is not unlikely that efforts will be made to establish manufactories in the Dominion, whose trade in phosphates with the States is very limited. It is worthy of note that the grain exported from Montreal in a single year has been estimated to contain 2574 tons of phosphoric acid, which implies the total exhaustion, so far as phosphates are concerned, of 75,000 acres of land, the renewal of which would necessitate the application of some 6000 tons of phosphate.*

That there is room for improvement in the practice of the French Canadian farmers of Quebec may be gathered from the following evidence of Mr. G. Larocque, of Beaumont, Bellechasse County, before the Select Committee on Agriculture. "The land is too little worked over, the ploughing is too superficial, made in haste, often at unseasonable times. The harrowing leaves much to be desired—one often sees wooden harrows. The ditches and trenches are neglected. Noxious weeds appear in masses in many of the fields. In general, the stables are not sufficiently spacious or well lighted. The ventilation is faulty, and cleanliness is not the order of the day. But animals are better treated than in the past. Fresh manure

* *Vide* Report of the Minister of Agriculture for the Dominion of Canada for 1883.

is employed too much on the surface without being buried in the earth." Professor S. M. Barré says, "Too much grain growing is the trouble, and the number of cattle kept is not proportioned to the extent of land under cultivation. We should keep more cattle."

The quaint appearance of the "native" cattle of the Province of Quebec is sure to attract the notice of the agricultural visitor. They are of Transatlantic origin, their ancestors having been taken over by the French settlers when Canada was a part of the Dominions of France. Cattle similar to them may still be seen browsing on the plains of Brittany, whence the old French-Canadian colonists derived their supply. These Quebec cattle are good milkers, and a few of them may be found at nearly every one of the snug homesteads in the valley of the St. Lawrence.

The reckless felling of timber without making any provision for future requirements has led the Quebec Government to take up the question of preserving and re-planting forests, and of tree-planting along the high roads and farms. The result has been the institution of an "arbour-day," or annual tree-planting holiday. It is not that there is not plenty of timber, for the revenue from the Crown timber lands of Quebec amounted in 1883 to 171,375*l.*, but that in certain districts it is being so rapidly and so effectually removed, that in some municipalities the people have to send fifteen or eighteen miles for a load of wood. The revenue from the Crown lands in Ontario in 1883 was 127,090*l.*, but both in this Province and in Quebec an official conservation of woods and forests seems urgently needed.

THE MARITIME PROVINCES.

The Maritime Provinces are those of Prince Edward Island, New Brunswick, and Nova Scotia. The greater portion of their surface is still densely covered with timber, and their climate has less pronounced extremes of temperature than is the case in the more western Provinces. It is probably indicative of the rigid precautions the Canadians resort to in order to preserve their live-stock free from disease, that there is no quarantine station in the Maritime Provinces, all imported cattle from Europe having to enter by way of Quebec; the Nova Scotians are, however, hoping to get quarantine stations established at Halifax and Yarmouth.

Prince Edward Island.—This is the smallest Province in the Dominion, its area being about the same as that of our county of Norfolk. It lies in the Gulf of St. Lawrence, to the north of New Brunswick and Nova Scotia, being separated from the

mainland by Northumberland Straits. For a space of three months in the winter the presence of ice renders communication with the mainland difficult and uncertain. The climate is less foggy and less changeable than in the two other Maritime Provinces. The surface of the island is slightly rolling, and is covered by a bright red loam of uniform character and marked fertility. The land is nearly all cleared; there are few manufacturing on the island, and it has been called the garden of the Dominion, visitors flocking there in great numbers in summer.

The history of Prince Edward Island is instructive. Soon after the peace of 1763 it was divided into townships, and granted, by means of a lottery, to a number of persons, many of them officers of the army and navy who had served in the war. Conditions were attached to these grants, of quit-rent, of reservations for churches and wharves, and particularly of settlement. But most of the grantees had no intention of settling. Many sold their grants, and the lands of the island gradually fell into the hands of a few people who did nothing to improve them, but remained in England, waiting to profit by the labour of the actual settlers. Properly, these grants should have been cancelled for non-fulfilment of the conditions, but they were not; the fertility of the island attracted numbers of settlers, and it was soon very generally under cultivation; but as the leases ran out, the absent landlords raised the rents. Then arose numberless disturbances, the pioneers who had brought the wilderness under cultivation not being able to understand the correct principles of property and land tenure. Among these settlers were eight hundred Highlanders taken out by the Earl of Selkirk, and they soon became prosperous farmers. The land question continued to agitate the minds of the people for years, until, in 1860, the Government appointed a Commission which valued the rights of the absent proprietors, and recommended their purchase by the Government, with a view to re-selling to the tenantry; the British Government, however, disallowed a Bill for promoting this object. Shortly afterwards another Bill was passed and allowed, under which the Government acquired the proprietors' rights, and thus put an end to further agitation. The Government acquired 843,981 acres, and in 1882 only 142,011 acres remained not taken up. Of this area 67,000 acres was indifferent forest land, so that only 75,000 acres remained under lease to tenants who had not purchased. In this manner was Prince Edward Island converted into a country of proprietors from a country of tenant farmers.*

* 'Handbook of the Dominion of Canada, 1884.'

This Province has no Bureau of Agriculture, and the only legislation of agricultural interest has dealt with an Act to regulate the management of the Government Stock Farm, the Domestic Animals Act, 1878, and an Act to prevent the spread of the potato bug, 1883. There is a considerable export trade in horses, cattle, and sheep to other parts of Canada and to the New England States. Perhaps the most peculiar feature in the farming of the island is the extent to which the mussel-mud of the rivers is used as manure. The mud is obtained by a dredging machine, worked by horse-power, on the ice over the beds of nearly all the rivers where oyster and mussel deposits occur. These deposits are from ten to thirty feet thick, and are made up of oysters, mussels, decayed fish, and seaweed. Used as a fertiliser, this material acts promptly and effectively, and produces very large crops of hay. Improved farms can be bought here at about 4*l.* per acre.

New Brunswick.—The Province of New Brunswick is not much more than half as large as England. Its extreme length, north to south, is 230 miles, and its greatest breadth is 190 miles; but it has a coast line 500 miles long, and indented with spacious bays and inlets. The coast upon the Bay of Fundy is rocky and sterile, except at the head of the bay, where are the rich Acadian marsh or dyke lands, which are referred to at length under the head of Nova Scotia. Along the shores of the Gulf of St. Lawrence the coast is low and sandy. The surface of the Province is undulating, densely wooded, and nowhere marked by any considerable elevations, though low ranges of hills surrounded by fertile valleys and table-lands are not uncommon. Besides being a farming country, New Brunswick is noted for its lumber trade, its fisheries, and its ship-building industry. It was originally settled by the United Empire Loyalists, “the vanquished champions of a lost cause—the victims of a political idea which was unsuccessful,—and they turned to the wilderness and founded new communities, in which are now manifested the principles of rational liberty which were present in their minds. . . . Shipload after shipload of refugees landed on the rugged shore of the harbour of St. John. Many succumbed to the hardships of the first winter, with scanty shelter and scarceness of food, ‘With death swooping down o’er their failure, and all but their faith overthrown.’ But there their descendants remain to this day, the most vigorous, the most courageous and most indomitable of the people who inhabit the Dominion of Canada.” And yet, somehow, New Brunswick, notwithstanding its great natural advantages, its fine maritime position, its many noble rivers, its fertile soil, and its excellent system of railways, does not

seem to come to the front, and is less known in Britain than are most of the other Provinces. Perhaps the Provincial Government authorities are a little apathetic in the matter, or possibly they think it better to allow people to learn what they can for themselves, should their inquiries be opportunely turned in that direction.

Forty years ago the Province of New Brunswick was, by order of the British Government, explored by Major Robinson, R.E., who, in his report to the Imperial Parliament, said :—

“ Of the climate, soil, and capabilities of New Brunswick, it is impossible to speak too highly. There is not a country in the world so beautifully wooded and watered. An inspection of the map will show that there is scarcely a section of it without its streams, from the running brook to the navigable river. Two-thirds of its boundary are washed by the sea ; the remainder is embraced by the large rivers the St. John and Restigouche. For beauty and richness of scenery this latter river and its branches are not to be surpassed by anything in Great Britain. The lakes of New Brunswick are numerous and most beautiful : its surface is undulating, hill and dale varying to the mountain and valley. The country can everywhere be penetrated by its streams.”

The Province has a Board of Agriculture, which takes charge of agricultural affairs and supervises the local societies. There are fifteen members—one from each county—and a secretary ; the chairman must be a member of the Government. The office is at Fredericton, the administrative capital. Unfortunately there are no agricultural statistics made up, except the meagre returns by the secretaries of the agricultural societies. Reliable returns would be invaluable, but there appears to be an indisposition to supply the funds which would be necessary for the official collection of figures. The areas under cultivation as shown by the last four Census Returns were :—

	Acres.					
1851	..	..	..	..	..	643,954
1861	..	..	..	..	..	885,108
1871	..	..	..	..	..	1,171,157
1881	..	..	..	..	..	1,253,299

But the acreage of improved land in 1881 was hardly more than one-tenth of the area capable of being profitably cultivated, and last year Mr. Julius L. Inches, Secretary to the Board of Agriculture, reported that not over 5 per cent. of the Province had been cleared of its timber.

I cannot discover the average yields of crops, but the following statement from the Census Returns shows the total yields in bushels in the years immediately preceding in each case :—

	1861.	1871.	1881.
Wheat	279,775	203,592	521,956
Barley	94,679	70,547	84,183
Oats	2,656,883	3,044,184	3,297,534
Rye	57,504	23,792	18,268
Peas and Beans	30,677	45,056	48,121
Buckwheat	904,321	1,231,091	1,587,223
Indian Corn	17,420	27,658	18,159
Potatoes	4,041,339	6,562,355	6,961,016
Turnips	634,364	603,721	990,336
Other roots	50,590	98,358	159,043
Hay, tons	824,166	844,793	414,046

From this it appears that barley and rye registered a decrease on the two decades. Indian corn was stationary, while there was a marked increase in wheat, buckwheat, and potatoes; the last-named are very successfully cultivated. As the Census Returns of 1881 state that there were 40,381 acres of wheat, 51,362 acres of potatoes, and 389,721 acres of hay, it follows that the average yields per acre of these three crops were: of wheat, 13 bushels; of potatoes, 135 bushels; and of hay, 1.06 tons.

The following is a similar statement, referring to the number of live-stock:—

	1861.	1871.	1881.
Horses	35,347	44,786	52,975
Working Oxen	19,111	11,132	8,812
Milch Cows	69,437	83,220	103,965
Other Horned Cattle ..	72,914	69,335	99,783
Sheep	214,092	234,418	221,163
Swine	73,995	65,805	53,087

The decrease in the number of working oxen and the concomitant increase in horses are evidences of improved methods of cultivation and of increasing prosperity amongst the farmers. The figures further indicate the increase in the dairy industry and in beef-growing. Though the quantity of ovine stock has remained almost stationary, the quality has much improved. The attention of the Government, as well as that of private breeders, has long been directed to the improvement of stock; and the establishment, in 1881, of the Government stock farm has been attended with good results. The native horned cattle of the Province originally came from New England and New York, and were of mixed breeds. Hardy, active, and generally

good milkers, they are not much adapted for the fattening process; but the Shorthorn grades raised from these attain large size and weight at an early age, and make admirable stock for the butcher. The introduction of improved breeds has led to the raising of considerable numbers of cattle for the English market, and some of the farms in the counties of Albert and Westmoreland stall-feed as many as 200 or 300 head in a winter. There is a Provincial Herd Book, in which farmers are invited to record the pedigrees of all pure-bred animals they possess, and the majority find it decidedly advantageous to do so. The pure-bred stock in the Province are chiefly Shorthorns, Ayrshires, Devons, and Jerseys, with a small number of Polled Angus and Norfolks, and a few Herefords. Last year the herd on the Government stock farm comprised 9 Shorthorns, 6 Ayrshires, 5 Norfolk Polls, and 4 Aberdeen Polls, with some 15 or 16 young animals, and by its means the Government can supply farmers with fine animals at a less cost than by continuous importing. The site of the farm has, however, not proved suitable.

Some useful information as to the present position of agriculture in New Brunswick was collected by the Select Committee on Agriculture of the Dominion House of Commons. Mr. E. B. Beer, President of the New Brunswick Farmers' Association, stated that there is a want of capital and experience, and that, as the surplus produce of New Brunswick has not been much in excess of the home demand, farmers have not seen the necessity of raising a better quality of produce. Mr. J. L. Inches considers that their agriculture does not suffer under any peculiar difficulties, except a rather low condition of farming. A fair proportion of farmers have adopted an advanced system, and use suitable implements, but the larger number do not. The heavy duty on shipments to the United States is felt, for this is almost the only external market there is for the agricultural produce of New Brunswick. Mr. S. L. Peters, of Otnabog, Queen's County, says their farmers require a more thorough knowledge of the kinds of crops best suited to the various soils, and of the most economical method of making them more productive. The scarcity of cheap labour is largely felt. "In the production of butter the great want appears to be the reluctance on the part of our farmers and dairymen to supply themselves with the most approved implements with which they can convert their milk into butter. By far the larger portion of them seem willing to stick to the shallow-pan system of their fathers. This might answer a portion of the year, but is ruinous for the other part of the season. With the deep can, or creamer, as it is called, in use in our dairies the first step in

making a good article of butter is secured. With these cans submerged in cold spring or ice water there is no difficulty in securing all the cream from the milk in twelve hours, either in dog days or any other time. With a good article of cream there should be no difficulty in producing a first-class article of butter which will command the highest price. The cheese of the Dominion will command a good price in any market." Small dairies and imperfect arrangements prevail at present. The fertilisers in use are barnyard-manure, superphosphates, fish, pumice, gypsum, and great quantities of mussel-mud from the shores of the Bay of Fundy and of the Gulf of St. Lawrence.

The late Professor J. F. W. Johnston, F.R.S., in a report he made some years ago on the Province of New Brunswick, arrived at the following conclusions:—

"1. That the soil of New Brunswick is capable of producing food for a population of from five to six millions.

"2. That in the capability of growing all the common crops on which man and beast mainly depend, the whole Province of New Brunswick, taken together, exceeds even the favoured Genesee Valley.

"3. That the climate is an exceedingly healthy one, and that it does not prevent the soil from producing crops, which, other things being equal, are not inferior, either in quantity or quality, to those of average soils of England."

The dyke lands of New Brunswick and Nova Scotia, and the intervale lands of the former Province, are peculiar and interesting features. The dyke lands are described under the head of Nova Scotia, and as regards the intervale lands I cannot do better than quote the words of my colleague, Professor J. P. Sheldon, who is well acquainted with the districts in which they occur:—

"The 'intervale lands' of New Brunswick are, as the name suggests, found in the valleys. The name is peculiarly appropriate and expressive. In England we should call them bottom-lands, or alluvial soils. They are, in fact, alluvial soils to all intents and purposes, with this peculiarity—they are still in process of formation. In some cases these intervale lands consist of islands in the rivers—and there are many such in the magnificent river St. John; but for the most part they are level banks on each side of the river, in some cases several miles wide, and reaching to the foot of the hills, which form the natural ramparts of the valleys they enclose. These intervale lands are rich in quality, and the grass they produce is very good. Like the dyke-lands, they need no manuring artificially. The dyke-lands, in fact, have such a deep excellent deposit of unusual richness, that manuring is superfluous; but the intervale lands receive a periodical manuring in the deposit which is laid on them each spring by the freshets of the rivers. They are, in fact, flooded more or less for several weeks in the spring of the year, and the deposit left by the receding waters is of a character to add fertility to an already rich soil, and, at the same time, to add to its depth. An inch or two of rich alluvial mud deposited on these lands each year is gradually raising them above the influence of the freshets; and they are to-day among the most valuable soils in the Province."

Considerable portions of the area of New Brunswick are, no doubt, destined to remain clothed with forest, being unfitted for profitable cultivation otherwise. This, at least, seems to be the inference deducible from the 'Report on Northern and Eastern New Brunswick and North Side of the Bay of Chaleurs,' by Mr. R. W. Ells, in which the following words occur:—*

"In all our explorations careful attention has been paid to the character of the soil in different localities. And it may be stated that in New Brunswick the finest soils are, as a rule, found on the Silurian or on the lower members of the Carboniferous systems. The rich and fertile districts of Carleton and Victoria counties may be cited as belonging to the Silurian system, while the beautiful valley of Sussex and the fine lands of King's and Albert counties result from the wear of strata which belong to the Lower Carboniferous formation. The soils formed from the Pre-Cambrian rocks, on the other hand, are generally hard, dry, and stony, while the Middle Carboniferous (especially its grey sandstones), gives rise to a soil which is too light and sandy to be of much fertility, and which, when once exhausted, is with great difficulty restored to good condition. Some portions of the Middle Carboniferous, however, consisting of purplish and reddish shales and sandstones, produce a soil of much greater strength and tenacity, often a stiff clay. This soil requires the addition of lime to make it easily and profitably worked. The Silurian soils, as a rule, contain in themselves sufficient lime; they are easily worked, and their fertility is very slowly exhausted. A knowledge of the distribution of the formation referred to may, therefore, prove of the greatest practical value to the immigrant and intending settler.

"It is to be regretted that, for agricultural purposes, so large a portion of the Province should be occupied by the grey and sandy portion of the Carboniferous system, and by granite and Pre-Cambrian crystalline rocks. In such districts the principal areas fit for agriculture are along the 'intervalles' or alluvial flats of the numerous streams, many of which are still uncultivated."

Nova Scotia.—"The marvellous country! The home of Evangeline, where Blomidon looks down on the tides of Fundy, and over tracts of red soil richer than the Weald of Kent." Thus speaks the Marquis of Lorne of Nova Scotia, the peninsular Province of the Dominion. It is connected with New Brunswick by an isthmus about 16 miles wide, and is 275 miles long by 100 miles wide at its greatest breadth. The island of Cape Breton, lying to the north of the peninsula, is 110 miles long by 80 broad, and is politically included in Nova Scotia, the area of the entire Province as thus constituted being about two-fifths of that of England. A line of water-parting extends lengthwise through the middle of the peninsula, most of the land on the eastern or Atlantic side of which is underlaid by hard Cambrian rocks that do not weather into very useful soils, they being hard, dry, and stony. The western half is composed of Silurian and Carboniferous strata, which disintegrate into a much better soil, the land in the south-west, along the Annapolis

* 'Geological and Natural History Survey of Canada: Reports of Progress for 1880-81-82.' Montreal. Published by authority.

valley, and around the Basin of Minas, possessing remarkable fertility.

This fertility, however, is not entirely of local origin, for much of the soil along the Bay of Fundy consists of rich marine alluvium. The configuration of this bay is such that it presents southwards to the open ocean two coast-lines, those of Nova Scotia and the mainland, receding from each other at an acute angle, consequently when the north-flowing tidal wave enters the bay it finds its lateral extension gradually contracted and so its waters get piled up. "Where the undulation meets with the resistance of converging masses of land and a shallowing bottom, it is heaped up, sometimes, as in the Bay of Fundy, to a height of seventy feet, and rushes along as a great wave or as a surging and foaming ocean-river."* Farmers along the lower reaches of the Severn valley in Gloucestershire will be familiar with a similar phenomenon, which there, however, only occurs with the high spring-tides, and produces the "bore." The tides of the Bay of Fundy spread themselves out over the adjacent coast-lands and have there deposited marsh soils of inexhaustible richness. In some of these saline swamps marsh-grass grows abundantly and yields a heavy crop. But large areas of the salt marshes have been reclaimed by means of mud dykes, so built as to prevent the irruption of the tidal water, and it is these dyke-lands which constitute so interesting and so peculiar a feature in Nova Scotia, along the Bay of Fundy, around the Basin of Minas, and on the adjacent shores of New Brunswick. The earthen dykes are strong and broad, six to eight feet high, and the land within them is firm and dry, and produces a great abundance of coarse but nutritious herbage. Some of this, which I examined on the salt marshes near Londonderry, I found to consist of cord-grass, *Spartina gracilis*, couch grass, *Triticum repens*, and one or two species of leguminous herbage. Year after year will these reclaimed marsh-lands give upwards of two tons of hay per acre and show no signs of running out, though they may become weedy. Should this happen, it is the practice to plough up portions at a time, at intervals of ten years or so, and to take a crop of wheat or oats, with which new grass seeds are sown. The salt hay, as it is termed, costs about 1*l.* per acre to make, and is worth from 5*l.* to 6*l.* per ton in the market. Most of the upland farms have some of these useful bottom dyke lands attached, and it is estimated that the latter extend over an area of some 70,000 acres. The cost of reclaiming and dyking these salt marshes varies between 1*l.* 10*s.* and 4*l.* per acre. The system of culti-

* Archibald Geikie, 'Phys. Geogr.,' p. 152.

vation involves surface draining by cutting ditches 22 yards apart, 3 feet wide at the top, 2 feet 9 inches deep, and sloping to a width of 1 foot at the bottom. Three or four years subsequently the land is ploughed in ridges of 6 to 8 feet wide, sown with oats, and seeded down with timothy grass and clovers.

On the marsh lands that have not been dyked the grass is cut and drawn on to the higher slopes to cure, and is stacked on rude platforms which, supported by piles, stand several feet above high-water mark, so that when the tide is in they look like so many hay-laden rafts. Each platform, of which sometimes as many as a hundred may be counted from one spot, carries a ton or more of hay, which is carted into the farmyard as required in winter, and there used in conjunction with ordinary hay, straw, and roots.

Ordinary dyke lands sell for from 10*l.* to 30*l.* per acre, but I saw some very excellent ones in the Cornwallis valley which had been sold at from 40*l.* to 80*l.* In the fertile country around Grand Pré there is rich meadow-land, much of it worth 50*l.* to 75*l.* an acre.

Longfellow has left us a very graphic picture of this, the classic land of *Evangeline*:—

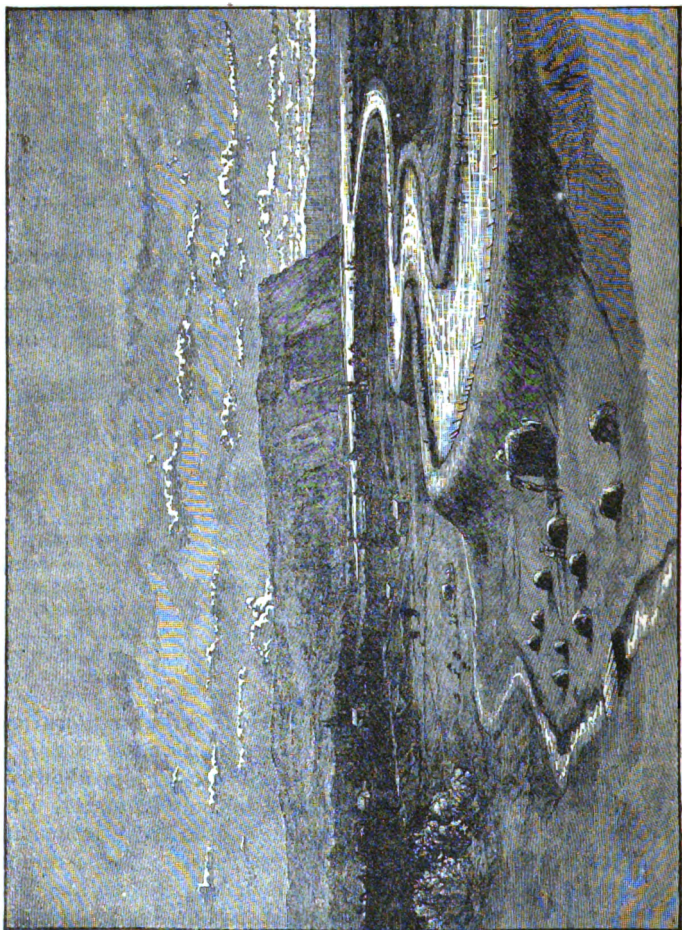
“In the Acadian land, on the shores of the Basin of Minas,
Distant, secluded, still, the little village of Grand Pré
Lay in the fruitful valley. Vast meadows stretched to the eastward,
Giving the village its name, and pasture to flocks without number.
Dykes, that the hands of the farmers had raised with labour incessant,
Shut out the turbulent tides, but at certain seasons the flood-gates
Opened, and welcomed the sea to wander at will o’er the meadows.
West and south there were fields of flax, and orchards, and cornfields
Spreading afar and unfenced o’er the plain, and away to the northward
Blomidon rose.”

Arriving at Grand Pré on a glorious autumn morning; I realised the wondrous fidelity of this description.

Of the 11,000,000 acres of land in Nova Scotia about one-half are regarded as fit for cultivation, but unfortunately I have not been able to acquire much recent statistical information of agricultural interest. The Province has no Department of Agriculture, though there is a somewhat irresponsible Board of Agriculture to which the Provincial authorities seem content to relegate any subjects affecting the farming industries. The last report of the Board stated that there were ninety-two agricultural societies in the Province, embracing 5064 members, that the subscriptions amounted to 1307*l.*, and the Government grant to 1367*l.* Nearly all the societies reported some action for the improvement of stock.

Between 1860 and 1870 the weevil was so destructive to the wheat crops that the cultivation of wheat was almost abandoned ; but with greater care and better method it has since been resumed, and the total yield increased from 300,000 bushels in

Cape Blomidon.



(From the Marquis of Lorne's 'Canadian Pictures'.)

1851 to 530,000 bushels in 1881, potatoes in the same time from 2,000,000 bushels to 7,500,000 bushels, and hay from 300,000 tons to 600,000 tons.

The following figures are from the Census Returns of 1881 :—

Land.

	Acres.
Occupied	5,396,382
Improved	1,880,644
Under Crop and Pasture	1,859,020
Orchards and Gardens	21,624

Number of Live Stock.

Horses	46,044
Colts	11,123
Working Oxen	33,275
Milch Cows	137,639
Other Horned Cattle	154,689
Sheep	337,801
Swine	47,256
Wool sold	1,142,440 lbs.

Field Products.

	Busbels.
Wheat	529,257
Barley	228,748
Oats	1,873,113
Peas and Beans	37,220
Buckwheat	339,718
Indian Corn	13,532
Potatoes	7,378,387
Turnips	1,006,711
Other Roots	326,143
Clover Seed	8,128
Rye	47,567
Hay	597,731 tons.

The average yields of crops in the western counties are, in bushels per acre :—

Wheat	18
Barley	35
Oats	34
Rye	21
Maize	42
Buckwheat	33
Beans	22
Turnips	420
Potatoes	250
Mangolds	500

The average yield of hay is 2 tons, but as much as 4 tons per acre of timothy grass and clover have been secured in some districts, and followed by a fair aftermath. The Canadian ton, it must be remembered, is only 2000 lbs. In Hants and King's counties, and in the counties of Annapolis and Cumberland, enormous yields of cultivated grass and of salt grass have been taken off the dyke lands and marshes.

Nova Scotia is pre-eminently a grazing country; and though

the agricultural societies have effected some good, there is still much room for improvement in the quality of live-stock, both of sheep and cattle. As will be seen from the Census Returns of 1881, there were owned in Nova Scotia that year 300,000 cattle and 400,000 sheep, of which 63,000 cattle and 151,000 sheep were sold for consumption. The nearness to the seaboard gives to the stock farmers of Nova Scotia an enormous advantage over their brethren in Ontario and farther west, in so far as the export cattle trade is concerned. In all parts of the Province they are within one or two days' journey of Halifax, the port of shipment; there is no wearisome overland travelling for the cattle, with its lowering of condition and waste of tissue, for the animals can be on board the steamer the day after leaving the farm, and Halifax is nearer than Montreal to Liverpool by 200 miles. The climate of Nova Scotia is more an insular than a continental one, and this is an advantage to a grazing country. Sheep in the south-west remain out all through the winter, the coldest period of which is usually in March, when the east winds blow off the ice floes in the Atlantic. The port of Halifax is open all the year round, and the Allan steamers run there from Liverpool weekly through the winter; the navigation of the St. Lawrence is closed from November to April.

The trade of Nova Scotia has practically doubled during the last twenty years, and the annual imports now represent 2,400,000*l.*, and the exports 1,800,000*l.* In 1883, the agricultural export was valued at 300,000*l.*, and included cattle sent to Europe; potatoes, for which the Province is noted, exported to the United States; and enormous quantities of apples shipped at Annapolis.

The fruit-growing industry of Nova Scotia deserves more than a passing word. Thirty years ago the Province imported apples, and now the annual shipment to Europe approaches half-a-million barrels of three bushels each, and they are worth in the English market from 20*s.* to 24*s.* per barrel. The Annapolis valley is one of the finest apple-growing regions in the world, its fertile soil and sheltered position admirably fitting it to this industry. I may here reproduce a few figures which I collected while driving through the orchard districts around Port Williams. An orchard of six acres was pointed out to me which would yield 1000 barrels of apples, and they would sell for 500*l.* Gathering and packing would cost 5*d.* per barrel, and 10 barrels might be filled by one person in a fair day's work. The barrels can be bought at from 10*d.* to 1*s.* each. Young apple-trees, fit for transplanting, cost from 1*s.* 3*d.* to 1*s.* 8*d.* each, and to plant one acre with trees at the rate of 40 to the acre involves an out-

lay of from 5*l.* to 6*l.*, which includes the cost of both labour and trees. Labourers' wages in the neighbourhood are from 25*s.* to 32*s.* per week during the busy season, and from 15*s.* to 17*s.* in winter, and the cost of living is less than in England.

I had the pleasure of travelling for some weeks in the company of Major-General Laurie, of Oakfield, Halifax, N.S., and desire to thank him for much enlightenment and information on many important matters. Although a Crimean veteran, the gallant gentleman is full of energy and vigour; he commands the Provincial militia, is president of the Board of Agriculture, has been farming for close upon twenty years in the Province, and is always to the front in any matter likely to have a favourable influence upon the development of agriculture in Nova Scotia. He has taken the lead in giving ensilage a trial, he is unwearied in his efforts to induce the Government authorities to establish an agricultural college and experimental farm, and he is now on the look-out for a winter oat suited to Nova Scotia, and I should be glad if some of our English seedsmen would make a note of this. His evidence before the Dominion Select Committee on Agriculture is valuable and interesting. He considers the Nova Scotian farmers labour under a great disadvantage in that they have had no agricultural education, so that many of them have no idea of what their land is capable of doing, or how to obtain the best return for their labour and outlay. Fruit-growers have bestowed much attention on their art and with exceedingly good results, but excepting these, and the few intelligent men who, under favourable conditions, are reclaiming marsh land with considerable profit to themselves, the vast majority of the farmers simply gain a subsistence, hence when money is in any way acquired, it is invested in anything rather than farming. Although there are five degree-conferring colleges in Nova Scotia, there is no provision for technical instruction in agriculture; and the suggestion, that one of these colleges should take up agriculture, is met by the objection, from all who have inquired into the subject, that agricultural faculties attached to arts colleges have invariably proved failures.

With regard to the dairy industry, some cheese-factories have been established in the Province, but there is no butter-factory. Recently the people of Colchester have embarked in a large milk-condensing business, which has so absorbed the milk of the district that some of the cheese-factories are paralysed. About 8 tons of milk per day are handled in this business, and all that cannot be profitably condensed is made into cheese. There is a more certain and continuous market for condensed milk than for cheese, and, besides, the former will keep better. The shareholders in the condensed-milk factory are largely

identical with those of a company which was engaged in factory cheese-making; but the latter business has been suspended for a time, and meanwhile the condensed-milk concern has made a good start by paying 8 per cent. as its first dividend. In Cape Breton there are some meat-canning establishments in operation; and in the Annapolis valley an industry is opening up in the canning of fruit, green corn, and tomatoes.

As to his own experience, I cannot do better than let General Laurie speak for himself:—

“A question naturally arises, whether the soil and climate of Nova Scotia are as favourable to the production of crops as other competing regions, and to this I must bring the testimony of eighteen years' personal experience in farming, on a new farm and therefore not under the most favourable conditions. Cattle live out at pasture from 1st June to 15th October, and thrive well during that time, and will hold their own for a month longer, if sheltered at night. All kinds of grain grow well. Oats and wheats are usually about 100 days from seed time to harvest. Last year 25 acres of spring wheat yielded me 25 bushels to the acre. Barley gives about 40 bushels to the acre; oats about 45, but there is a tendency to lodge when the crop is heavy. Potatoes have usually given me about 275 bushels to the acre, and swedes from 550 to 800, according to the season, and exposure of the field; if facing south or west, giving the smaller crop on account of the heat, and if north or east, the larger; thus showing that we are near the southern limits of turnip growing, as they do best in the cooler places. This has led me to turn my attention to growing Indian corn for ensilage, on which I can only consider I am experimenting; but last season, I cut (weighing sample carts as I hauled home) 20 tons per acre on a field of 15 acres. It seems admirably suited to the climate as a plant, and the mode of preservation is economical and the food appears valuable. Hay, the too-favourite crop of our farmers, averages (weight calculated when taken for feed and not when hauled off the field) $1\frac{1}{2}$ tons to the acre on the upland fields. On 170 acres of cultivated land, in addition to keeping ten horses, and about the same number of cows, the year round, I raise sufficient food, with the addition of some purchased oilcake, which can be paid for by the sale of other surplus crops, to feed for the butcher 100 head of store cattle yearly. Permanent grass is practically unknown as, owing to the damp spring and autumn, it becomes overgrown with moss. Our most prosperous farming districts are those near tide water, where the flats have been dyked and the flow of the tide barred. On these, hay yields $2\frac{1}{2}$ to 3 tons to the acre without impoverishment, and the after pasture is magnificent; and as the upland in these districts is usually light, the manure furnished from the dyke-land hay enables repeated crops of potatoes to be raised for sale, so that cattle and crops can both be sent to market.”

I do not think any one can travel much about Nova Scotia without noticing one very obvious reason why its agriculture is not in a more flourishing condition, namely, that the farming industry is hard pressed by three others, for each of which the Province is widely and deservedly noted. These are mining, fishing, and shipbuilding. There is an abundance of coal and iron in the Province, gypsum is largely quarried, and gold is worked at about twenty places. But the maritime industries are the chief attraction, and if there are fish to be

caught, or ships to be built, the farms may look after themselves. Imagine my surprise when, one day at a farm near London-derry, I was walking through the farmyard to get to the big barn that I might handle the salt hay which was being brought in, and a sudden turn brought me alongside a nearly completed, good-sized, sea-going vessel! There she was, at the end of the farmyard, resting high and dry upon the slips, which were directed downwards to a narrow channel filled just then with the fertilising red slime which may always be seen when the tide is out. No doubt she has been launched long ere this; the obliging tide would fill the channel, the wedges would be knocked away, and in a moment the farmers would see their good ship floating on the shore waters of the Bay of Fundy, whence she would be towed away for the completion of her equipment. Then, I presume, our friends would turn their attention to the farm till they got another ship on the stocks, or perchance till the mackerel or shad should strike in along the shore, when the farm would be forsaken for the boat and net.

In my Report to the Department of Agriculture of the Dominion Government there occur the following words, and I reproduce them, merely observing that most of the points alluded to are equally applicable to the other older Provinces as to the one now under notice :—

“Nova Scotia is in need of farmers who will give farming the first place in their consideration, who can bring with them some of the improved practices of modern agriculture, who can intelligently combine pastoral with arable farming, who know something of dairying, who understand how to manage and at the same time to improve a flock of sheep, who in laying land down to grass will not rest their faith solely in timothy, and who in estimating the yields of their root crops will discard the bushel measure in favour of the weighing machine.”

There can be no doubt, then, that Nova Scotia offers good opportunities to farmers with some experience, and of all the provinces of the Dominion this is perhaps the most English-like in general character. In arable and stock-farming, in particular, the application of approved modern practice would soon tell its tale, and the exceptional facilities the Province enjoys with respect to the export trade should be a strong incentive to the speedier development of its agricultural resources. My observations with regard to the defects of Nova Scotian farming must not, however, be read without some modification; and it is but fair to state that I did see farms on which it would be very difficult either to find fault or to suggest improvements. Around the town of Windsor, where, through the kindness of the Sheriff, I took a long circular drive, I saw a splendid and picturesque farming country, with plenty of live-stock, and numbers of com-

fortable-looking farmhouses, the whole forming a picture which might be equalled but not often excelled in England. Near the flourishing town of Truro, again, some excellent farming may be seen. In Nova Scotia, as in the more western Provinces, the instinct for pioneer farming has a strong hold upon the people, and hence there are numbers of good farms for sale on account of their former occupiers having moved westward, or having perhaps embarked in other of the local industries to which reference has been made. Several tidy farmsteads were pointed out to me which, land and buildings together, might be bought for sums varying from 160*l.* to 200*l.*, according to the degree of cultivation. Improved farms of 100 to 150 acres, with house and buildings, are to be purchased at from 100*l.* to 500*l.* Uncleared Crown lands are offered by the Government at 8*l.* 16*s.* per 100 acres or less, so that 20 acres would cost as much as 100. Any quantity over 100 acres can be paid for at the rate of 1*s.* 10*d.* per acre.

I cannot conclude my brief notice of this charming Province without expressing my thanks to His Honour the Lieutenant-Governor of Nova Scotia, to the Mayor of Halifax, and other gentlemen, for their kindness and hospitality, which had the effect of making my visit as pleasant as it was instructive.

THE SELECT COMMITTEE ON AGRICULTURE.

The Dominion House of Commons last year appointed a Select Committee to inquire into the best means of encouraging and developing the agricultural interests of Canada. For this purpose the Committee took the evidence of persons who had made special study of the various branches of industry comprised under the more general term of Agriculture, of others possessed of wide scientific knowledge having a direct and important bearing upon agriculture, and of others again, who, being practical Canadian farmers, were well qualified to express the general feeling as to the wants and disadvantages experienced by agriculturists in Canada. The Committee further sent out a series of questions to agriculturists in all parts of the Dominion; these questions are too numerous to reproduce here, but it is worth noting, that the subject which, perhaps more than any other, has for the last year or so been prominently before the agricultural public in England is not in any way referred to,—that, namely, of ensilage. The leading subjects in the answers to the questions, as well as in the oral evidence, relate to deficiencies in the cultivation of cereals, roots, and grasses; in stock-raising and wool-growing; in dairy products, fruit culture, and fertilizers; to the importation of seeds, fruit-tree scions,

and plants, from countries under climatic conditions similar to those of Canada; the establishment of an experimental farm, and of a central bureau of agriculture, with a section devoted specially to statistics, recording the acreage under crop, movements and prices of produce, rates of transportation, and conditions of foreign markets, with the publication of such information by the frequent issue of bulletins and abstracts, and the dissemination of instruction on the various branches of agriculture through the medium of handbooks and reports; the ravages of birds and insects, and the appointment of an entomologist.

An examination of the replies sustains the view that more thorough agricultural knowledge, particularly of the kinds of crops most suitable to the various soils, and of the most economical and efficient methods of production, is the want that is most keenly felt. Notwithstanding the great progress made in recent years, there is still a large amount of defective farming. In the cultivation of cereals, roots, and grasses the chief drawbacks are want of periodical change of seed and its right selection, the absence of judicious rotations of crops, and a lack of thorough tillage and of knowledge of the value and suitability of manures. Much fertilising power is lost through negligent exposure of farmyard-manure and the waste of the liquid manure. In stock-raising there is a deficiency of pure-bred males, and a want of knowledge of the adaptability of breeds to particular conditions, while better pastures and more tree-shelter are needed. In fruit-culture, there is experienced a want of hardier varieties, and of varieties with improved keeping qualities. There is wide-spread and deplorable ignorance regarding the insects and diseases to whose attacks fruit-trees are so liable. As to the defects in the dairy industry, I have dwelt upon these in another section of this paper.

The following Table is interesting, as showing the prevalent feeling amongst Canadian farmers with reference to the subjects mentioned. It shows the numbers of those who approved and of those who disapproved each of the propositions named:—

	For.	Against
Establishment of Experimental Farm ..	278	64
Appointment of Entomologist	198	117
Establishment of Central Bureau	256	62
Section devoted to Statistics	211	74
Handbooks, Reports, and issue of Bulletins	255	48

Thus there was a majority in favour in every case all over the Dominion, and there was, moreover, a majority, in every case, in each Province.

Cultivation of Beet.—Several reliable authorities are of opinion that the beet-root sugar industry is as capable of successful prosecution in Canada as in Central Russia, and it is even maintained that the cultivation of the sugar-beet in Quebec would prove as beneficial to that Province as it did to France. I would, however, venture to suggest that, in case the industry is established, the roots should not be purchased by weight, as has been the custom in France, but according to their richness in sugar, after the German method. The former system has led the French beet-root growers to adopt the most lavish dressings of manure in order to swell the tonnage per acre, and they have succeeded, but only at a considerable sacrifice of the saccharine properties of the roots. Perhaps, too, as maize grows so freely in Quebec, the adoption of the rotation recently recommended to the French farmers, in the *Annales Agronomiques*, by Professor Dehérain, would be a step in the right direction.

Injurious Insects.—The annual loss which Canadian farmers sustain through the ravages of injurious insects is appalling. Mr. J. Fletcher, Vice-President of the Entomological Society of Ontario, says that, taking the average annual farm-produce of Canada at only 40,000,000*l.*, which is the lowest possible estimate, the lowest figure at which he can put the injury done by insects is one-tenth of the whole, or 4,000,000*l.*; he believes that the ravages of the wheat-midge, the Hessian fly, and particularly the clover-seed midge, are all preventible. Mr. W. H. Harrington, Ottawa, says it was in 1856 or 1857 that the wheat-midge—whose orange-coloured larvæ in the furrow of the young grain are well known to English farmers—first appeared in Canada, and the damage it did to the wheat-crop in Ontario in one of those years was estimated at 1,600,000*l.* It had previously, in 1854, been very destructive in the United States, where it was introduced from Europe about the beginning of the present century. Of late years the damage has been lessened in Canada by using midge-proof wheat. Certain varieties of wheat, producing an inferior grain, and a hard coat, were found not to be touched by the midge. These were hybridised with wheat yielding a good grain, and the result was a better quality of grain, retaining the hardness of coat which baffles the attacks of the midge. Similarly the Hessian fly has been dealt with by producing plants with heavier stalks. This pest feeds in the joint of the stalk above the root, and if the stalk is too hard for it, not much harm is done. Mr. L. Van Camp, of Bowmanville, Ontario, a farmer delegate from the Dominion Grange, says :—

“As for the insect scourge in agriculture, it places the agriculturist in a continual warfare from the time the frost leaves the soil in the spring until it

binds it up again in the fall. During all that time the agriculturist has no leisure. If he wishes to be prosperous he must only take sufficient time to eat his meals and sleep. At other times he must be carrying on a continual warfare with these insects. There is something to attack everything that the farm produces, and if we do not give attention to it the crop is sure to be a failure."

Here is work for a State Entomologist! And it is satisfactory to be able to add that last year a Dominion Entomologist was appointed by the Minister of Agriculture, the first occupant of the post being Mr. James Fletcher, whose name has already been mentioned. In his preliminary report, Mr. Fletcher states that he has commenced the collection of a representative exhibit of the injurious insects of Canada, together with the plants attacked by them, and the mode of attack, as well as the beneficial insects which keep the injurious kinds in check. During the present year the cutworms, clover-insects, insect parasites of cattle, and the larch saw-fly, which was first recorded as a Canadian insect in 1882, have been selected as special objects of study and investigation. Last year one of the joint-worms did great harm to the grass-crops of Western Ontario, and entirely destroyed some of the hay-crops in New Brunswick. The extent of the damage done by the clover-seed midge is sufficiently evidenced by the fact that, whereas a few years ago large quantities of Canadian clover-seed were exported to the United States, where there was a great demand for it, at the present time Canada has to import seed for home-growth. Last year the larva of the larch saw-fly, which is new to Canada, did so much mischief, that the tamaracs were, in many parts of New Brunswick, Quebec, and Ontario, almost completely deprived of their leaves.

An Experimental Farm and Central Bureau of Agriculture.—A very strong feeling prevails in favour of the establishment of an Experimental Farm, and of a Central Bureau of Agriculture. Though the Dominion Cabinet includes a Minister of Agriculture, the Department of Agriculture has to concern itself with several matters which have little or no connection with agriculture. That this is so may be inferred from a summary of the contents of the Minister's Annual Report to the Governor-General, which embraces the following sections:—I. General Remarks. II. Arts and Agriculture. III. Patents. IV. Copyrights, Trade Marks, &c. V. Quarantine. VI. Immigration. VII. Census and Statistics. VIII. Health Statistics. Mr. John Lowe, the able and experienced Secretary of the Dominion Department of Agriculture, states that the Act of 1868, constituting the Department of Agriculture, would amply provide for the establishment of a Bureau of Agriculture, and for the

appointment of a Commissioner of Agriculture. There has hitherto been no special vote for the general purposes of agriculture, although there have been special votes in particular cases, as for cattle quarantine and inspection, the collection of statistics in certain special cases, and grants to exhibitions; up to the present these have comprised the whole functions of the Department in relation to Agriculture.

As this subject is not without current interest at home, I may briefly refer to the work done by the United States Department of Agriculture at Washington. Originally embraced in the Patent Department, the United States Department of Agriculture was formally and permanently organised as a distinct department in 1860. Its work consists in (1) the dissemination of rare and valuable plants and seeds, which are procured both by purchase, and by exchange with foreign countries; (2) the communication to different districts of the information derived from other localities as to soils, methods of cultivation, climatic influences, &c.; and (3) the publication of results obtained in the principal subdivisions through their researches and experiments. Congress has been liberal in its grants to the Department, which, in the year ending 30th June, 1882, expended considerably over 70,000*l.*, the items including: purchase and distribution of valuable seeds, 16,000*l.*; experiments in tea-culture, 1750*l.*; experimental garden, 1400*l.*; investigating natural history of insects, 4000*l.*; investigating diseases of swine, 4489*l.*; reclamation of arid and waste lands, 2000*l.*; report on forestry, 1000*l.*; experiments in manufacture of sugar, 6466*l.* The fact that the work of the Department is constantly extending, and that the expenditure is growing annually, may be taken as evidence that the people of the United States believe their Department of Agriculture is worth its cost. Many products are now successfully and profitably grown that were introduced and first experimented on by the Department. Within the last few years experiments have been made at considerable expense with the sorghum sugar-cane, with the tea-plant, and for the encouragement of grape-culture and wine-making. Should these experiments prove successful, and lead to extensive and lucrative prosecution of the industries connected with the growth of these articles, the cost will be insignificant beside the results. By experiments such as these the United States Department of Agriculture has already conferred great benefits upon the people.

Recommendations of the Select Committee on Agriculture.—The following is the conclusion of the Select Committee's Report to the House of Commons:—

“Considering that the proper development of our agricultural resources is indispensable to the upbuilding and maintenance of our national wealth and

prosperity, and that all progressive countries are at present making strenuous efforts for the introduction of improved methods of agriculture, your Committee believe that no object is more deserving of the active and generous support of the Federal Government than that of fostering and promoting this great industry, and of prompting, guiding, and co-operating with all local and provincial institutions formed for the furtherance of this object. Your Committee, therefore, beg leave to submit the following recommendations:—

“That the Government take into earnest and favourable consideration the advisability of establishing a Bureau of Agriculture, and an Experimental Farm in connection therewith.

“That this Bureau be formed in connection with and under the supervision of the present Department of Agriculture.

“That the objects aimed at in the establishment of such Bureau and Farm be as follows:—

“1. To conduct such experiments in the introduction and culture of new varieties of seeds, plants, trees, &c., as will most efficiently aid in the advancement of Canadian agriculture; to institute experiments with regard to the comparative value of fertilisers, the proper testing of seeds as to vitality and purity, and the healthy preservation and productive conditions of plants and animals.

“2. To make careful investigation into the origin, distribution, and habits of insects injurious and beneficial, and the contagious and other diseases to which animals and plants are subject, in order to arrive at the best methods of destroying and counteracting them.

“3. To study the qualities of the various breeds of cattle and other domestic animals, with the view of reporting on the best means of improving them; of protecting them from parasites and epidemic diseases, of feeding them for the market, and on the treatment of milch cattle.

“4. To initiate and carry out a convenient and comprehensive system of gathering the latest and most useful information, statistical and otherwise.

“5. To publish and send to the press and the various agricultural and horticultural societies of the Dominion, at different periods of the year, bulletins giving the results of trials made on the Experimental Farm, and whatever other information the Bureau may consider useful, either in the prevention of the ravages of insects and of contagious diseases among animals, or concerning improved methods of culture that have stood test, or for the special advancement of any line of agricultural pursuits.”

Horse-breeding in Canada.—From the Census Returns of 1881 it is inferred that the total annual value of agricultural produce in Canada may be estimated as follows:—

	£
Horses	1,186,284
Cattle, killed or sold only	3,288,405
Sheep	1,496,465
Swine	3,907,509
Wool and Honey	602,552
Total Animal Produce	£10,481,215
Dairy Produce	4,288,502
Hay	6,066,972
Grains and Hay Seeds	18,403,249
Roots	4,518,968
Grand Total	£43,758,906

Horses make up more than one-tenth of the animal produce, and Mr. E. A. Barnard, Director of Agriculture, Quebec, has drawn attention to the neglect of horse-breeding in the Dominion. Considering the demand for good draught and driving horses both in Europe and in the United States, and the special facilities many parts of Canada—particularly Prince Edward Island, the present Arabia of the Dominion—possess for the raising of horses, the returns from this source should be largely increased. Moreover, the difficulty of procuring remounts for the cavalry and artillery regiments of the British army increases every year, and the authorities might with advantage turn their attention to the capacity for horse-raising which the Dominion possesses. Canada exports hay and coarse grains sufficient to enable her to raise for exportation ten times as many horses as leave her shores at present. The following figures are from the Trade and Navigation Returns, 1883:—

Value of Exports of Hay and Coarse Grains from Canada, 1883.

	£
Barley	1,258,647
Peas	432,342
Other Coarse Grains	310,837
	£2,001,826

Hay.

	£
1881	363,712
1882	183,138
1883	180,421
Total	£727,271
Hay—Average of three years	242,424
Total	£2,244,250

It is reasonably suggested that, bearing in mind the continued efforts made by the European States to improve the raising of horses, all this coarse food might well be kept to increase the number of good horses—for nobody wants bad or poor horses—thus securing much higher profits, besides retaining a large quantity of valuable manure. A regular and official inspection of stallions has even been proposed, and Dr. McEachran has suggested the desirability of imposing a heavy tax on all stallions unfit for useful reproduction. I may here observe that the farm horses in Canada are, as a rule, much lighter than the horses to be seen on arable farms in England. When a visitor calls on a Canadian farmer it is no unusual thing to see a horse taken from the plough and put

into a dog-cart or light waggon, and start off at a good swinging pace round the farm.

Agricultural Production in Canada.—The following Table is given on Mr. Barnard's authority :—

Lowest estimated value of Farm Stock in Canada.

	£
Horses and Colts	11,906,284
Working Oxen	795,558
Cows	7,979,600
Other Cattle	5,359,788
Sheep	3,048,678
Pigs	2,173,714
	£31,263,622

It is maintained that, by better selection, and by a more rational system of feeding in summer and in winter, the cash value of farm stock, and the returns therefrom, might be doubled in a few years.

How much the agricultural production of the Dominion might be increased by proper care is amply illustrated by the case of eggs. A Table in the first part of this paper shows the annual export of eggs from Canada to be valued at nearly half a million pounds sterling,—40 per cent. above the value of the export of horses, and 60 per cent. above that of sheep. Even the export of cattle, which has created so large a trade for the ocean steamships, does not produce more than 75 per cent. over that of eggs. This export of eggs, moreover, simply represents the surplus after all home demands have been liberally supplied.

On a rough estimate Canada can produce pure-bred cattle at about half the outlay to which the English farmers are put, and can finish off beef and mutton at about two-thirds the cost. This is due largely to cheaper crops, and to the admirable system of quarantine whereby freedom from fatality induced by disease is secured. It is beyond doubt that the Dominion can produce the best of cattle; and as the Canadian farmers launch out more extensively in the stock-raising business, so will they feel compelled to resort to suitable and approved rotations of crops made subsidiary to stock-raising, stock-fattening, and milk-production. The Maritime Provinces, so admirably adapted to the requirements of live-stock, must speedily show signs of this, particularly as wooden ship-building is on the decline.

Indeed, it is probably a safe statement to make, that wheat-growing in Canada is moving westward, and is destined to undergo a marked contraction in the Eastern Provinces, where,

as I have previously taken occasion to remark, the limits of the natural fertility of the soils have in many cases been passed. Even now, the average production of wheat, taken over all the wheat-lands of the Dominion, barely reaches 14 bushels per acre. How, in the Eastern Provinces, the yield of wheat has been steadily reduced, Professor Brown has aptly pointed out: "We did not stop at 16 bushels, because: (1) we could easily increase the productive area; (2) grain is less expensive to produce; (3) it is a lazy system of farming, and thus most acceptable to the many as against the few; and (4) the product has always been in demand." And the same arguments would hold for not stopping wheat-growing when the yield had dwindled to 14 bushels, to 12, or even 10. And, no doubt, this love for wheat-growing will go a long way to explain how it is that eastern farmers, particularly of Ontario, rather than embark extensively in stock-raising, stock-fattening, and the necessary rotation of crops based on English and Scotch methods, prefer to sell their old farms and go on to the western prairies, where they can buy virgin soil at one-quarter to one-tenth the cost per acre of what they realised on their eastern holdings, and thus embark again upon continuous wheat-growing. By such means they are, moreover, enabled to establish their sons on separate farms, which, in the majority of cases, they could not do on the higher-priced lands of the East. There must further be taken into account the restless pioneer spirit which still animates the breasts of probably most Canadian farmers; there is no feeling of sentiment awakened, no ancestral associations rudely broken, when the Canadian farmer gives up his eastern holding, and, impelled almost by a nomadic impulse, seeks fresh fields of labour in the direction of the setting sun.

As things are now, much of the Canadian soil has been run out by continuous grain-cropping, the acreage under cereals being out of all proportion to the requirements of good farming. Approximately, the proportionate acreage of crops in the Eastern Provinces is,—cereals, one-half; hay, one-fourth; pasture, one-eighth; roots, one-sixteenth; leguminous crops, one-sixteenth. Nevertheless, with a more rational system of farming, there would not be much difficulty in at least doubling the average yield of cereal crops per acre. According to the Census Returns of 1881, the total area of land in hoed crops of all kinds did not exceed 4 per cent. of the land under cultivation. And yet Indian corn, with its rapid and luxuriant growth, is an admirable crop for smothering weeds, and might well be employed in conjunction with roots for the cropped fallows. With abundant manure and extensive horse cultivation, and with a selection of seed suited to their northern climate,

Canadian farmers can grow from 75 to 100 bushels of corn per acre, at a cost not exceeding 2s. per bushel, to say nothing of the three or four tons of excellent fodder; as green food, Indian corn properly cultivated and fed in conjunction with other fodder, has been proved to be one of the cheapest and one of the best articles of diet for the production of meat or milk.

Grass Lands.—Turning for a moment to the consideration of grass lands, nothing is calculated to surprise an agricultural visitor to Canada more than the paucity of cultivated grasses. The Dominion farmers, indeed, cultivate but one grass, and that is timothy. A field of timothy, and nothing but timothy, was a novel sight to me at first, but I soon got used to it. So common is timothy, that it has long since escaped from the cultivated lands, and is a familiar weed-grass almost everywhere in Eastern Canada,—along road sides and railway tracks, and on waste lands in or near the towns. And the people evidently believe in timothy, pure and unmixed, for growers are as ready to give, as buyers are eager to demand, a guarantee that the “tame” hay they offer for sale is clean and pure timothy. Similarly, of the leguminous plants, only the common red clover seems to be generally cultivated. Foxtail, cocksfoot, the fescues, the meadow grasses, and the rye-grasses are almost unknown in cultivation; and the same may be said of Dutch clover, alsike, black medick, “trifolium,” and sainfoin. Catch crops, and “seeds” for two or three years’ lay, are quite outside the practice of the bulk of Canadian farmers. Still, in justice to the Ontario Experimental Farm, it must be stated that most of these green forage plants are being submitted to trial, and that the valuable results hitherto obtained have already attracted the notice of the more progressive farmers of the Province, some of whom are sowing mixtures of grass-seeds, and otherwise introducing the cultivation of a valuable group of plants which have too long been neglected. Very satisfactory results have attended the trials of lucerne, and there is no doubt that this crop might be grown with great advantage in most districts where the latter part of summer is usually droughty, as in such circumstances it would be an invaluable adjunct to failing pastures. Hungarian grass, a species of *Setaria*, one of the millet grasses, is, by the way, somewhat largely grown in certain districts, but I should think it would be well to replace it with mixtures of ascertained utility. The laying down of land to grass is a problem that will have to be grappled with before long in Eastern Canada, and, in the event of the proposed Central Bureau of Agriculture being established, it should certainly provide for an efficient seed control, otherwise incalculable mischief may arise from the scattering of impure and ill-chosen grass-seeds throughout the land.

Better care of the manure heap is imperatively necessary. Mr. Barnard says, "The liquid manure, which is worth more than the solid matter, is mostly all lost; then the solids are cave-washed, burned, or fire-fanged, before carting to the field, and there too often sun dried. As generally treated by nearly all farmers in Canada, manure goes to waste to a greater or less degree, but aggregating to 75 per cent., as I believe can be proved unquestionably. As long as this waste is allowed, but little interest can be given to the very important question of artificial fertilisers."

But signs of improvement are not wanting, particularly in Ontario, where drainage is now being much resorted to, better roads are being made, and straight fences are replacing the snake fences which occupy so much room and so freely harbour weeds in their innumerable angles. In this progressive Province, too, the cultivation of a larger number of species of grass, and the laying down of permanent pasture, must be included among the new departures. And, as already mentioned, rotations of crops are slowly finding their way into practice, while marked improvements are noticeable in the winter feeding of live-stock.

In Canadian farming, machinery is used to a much greater extent than is the case in England. This arises, of course, from the character of the seasons in Canada, for practically there are only two divisions of the year,—summer and winter. Such autumn as there may be is short, spring is shorter. Seed time, therefore, is a period of great pressure, and incessant labour; harvest is an equally busy time, so that much of the manual labour of our own country devolves upon machinery in Canada. The implement manufacturers are gradually concentrating their efforts on one or other of three branches,—the cultivating, the seeding, and the harvesting; and in Canada, as in the United States, each season brings with it some new design or improvement. This rapid extension of mechanical aids is gradually rendering superfluous much of the skill of the husbandman, as in the case of the sulky ploughs, which seat the driver, and cut one furrow. I may here mention a few of the prices. The Buford sulky plough, 12, 14, and 16-inch cut in steel bottoms, and furnished with rolling coulter, 11*l.* to 13*l.*; the Buford *gang* sulky plough, cutting *two* furrows, each 12 inches wide, made entirely of iron and steel, except the pole and whippletrees, and with rolling coulters, 20*l.*; ordinary ploughs, 3*l.* to 4*l.*; whipple spring harrow for preparing stiff, rough, or dirty land for seed, 7*l.* to 9*l.*, according to size; Monarch potato digger, 2*l.* 8*s.* Among the commonly seen implements are the Massey mowers, harvesters, and rakes; the Brantford two-horse

twine binders, wide-cut corn binders, front-cut and rear-cut mowers, and spring tooth harrows; and the Hoosier grain and fertiliser drills. Even the use of straw for fuel on the prairie has been provided for, as in the Abell straw-burning portable engine. The general excellence of Canadian agricultural machinery cannot fail to impress the observer.

I have alluded to the migratory habits of Canadian farmers, which undoubtedly constitute a hindrance to better farming. Another check arises out of the tempting and almost unlimited field for speculative land purchases by wealthy individuals and companies who are in a position to acquire large tracts of land to the exclusion of ordinary settlers. The men who are attracted to Canada are, as a rule, the reverse of wealthy; but, at the outset, a deficiency of ample means is probably a much less evil than a lack of agricultural knowledge. The easy and inexpensive sale and transfer of land is another element not to be left out of consideration; and as regards the ownership of the soil, I may again quote my colleague, Professor Sheldon, who, in addressing the Economic Section of the British Association, at Montreal, last August, said,—

“The Canadian farmer owns the land he farms, and can do with it what he likes. All very well, this, when ownership does not bury too large a capital; but in course of time, as land increases in value, a landlord and tenant system will grow up in Canada, and it would be well that it should at the outset be defined on equitable lines. The British farmer avoids the loss which comes of a fall in the value of land—a loss from which every agricultural landowner in Britain is suffering to-day, more or less—and his capital is all available for active operations. So long as the industry of farmers is duly shielded from injustice, it is a loss rather than a gain to them to be landowners, for landowning at 2½ per cent. is a luxury in which bread-winners can hardly afford to indulge.”

The transfer of land in Canada is very easily and cheaply effected. In every district there is an office in which titles to land have to be registered. All mortgages or other charges made upon property have to be recorded in the same way as the titles, and are not valid unless this is done. A person, therefore, desiring to purchase land, can prove at a trifling cost the *bonâ fides* of the title that is offered, and can also ascertain what charges or encumbrances may be in existence. This, generally and strictly, is the system in operation throughout the Dominion. The matter is one that is dealt with by the local governments, and the details may, therefore, to some extent differ in the various Provinces. The general desire, however, is to simplify as much as possible such transfers, and to get them effected cheaply. It is not unlikely that the present arrangements may be amended by the adoption of the Torrens system, now in force in Australia, which is an amplification of that in use in Canada.

CANADIAN FORESTRY.

Though occasional references have been made to the forests of different parts of the Dominion, the subject is of such great importance, both present and prospective, as to call for a brief separate notice. Dr. Robert Bell, whose knowledge of the Canadian forests extends over a quarter of a century, arranges the trees found east of the Rocky Mountains in four geographical divisions:—

1. A northern group, including the white and black spruces, larch, Banksian pine, balsam fir, aspen, balsam poplar, canoe birch, willows, and alder. These cover the vast territory down to the line of the white pine.

2. A central group of about forty species, occupying the belt of country from the white pine line to that of the button-wood.

3. A southern group, embracing the button-wood, black walnut, the hickories, chestnut, tulip-tree, prickly ash, sour gum, sassafras, and flowering dog-wood, which are found only in a small area in the southern part of Ontario.

4. A western group, consisting of the ash-leaved maple, bur-oak, cotton wood, and green ash, which are scattered sparingly over the prairie and wooded regions west of Red River and Lake Winnipeg.

Mr. A. T. Drummond, who has made a special study of Canadian forestry, says:—

“Canada may be divided into four great forest areas or zones, which may for convenience be termed the zones of the (1) Douglas fir, occupying central and southern British Columbia; (2) poplars, covering the whole country from the most northern limit of the growth of trees southward, east of the Rocky Mountains, to the south Saskatchewan, Qu’Appelle, and Winnipeg Rivers, Lake Nepigon, and Anticosti, in the Gulf of St. Lawrence; (3) white and red pine, extending from the Lake of the Woods and Lake Nepigon, to Anticosti; thence to the Georgian Bay, Lower Ottawa River, and Nova Scotia; (4) beech and maple, occupying those parts of Ontario and Quebec lying south of the zone of the pines. Along the shores of Lake Erie is what might almost be regarded as a fifth zone, very circumscribed in area, but having within it several outliers of the forests of the Middle States.”

Of the 340 species of forest trees of North America only 95 are to be found in Canada, and of these only three are identical with European species, namely, the chestnut, white birch, and yew. With regard to the future supplies of timber which may be available in Canada, Dr. Bell finds that the greater part of

the white oak and rock elm have been already exported, while the cherry, black walnut, red cedar, and hickory have likewise been practically exhausted. Red oak, basswood, white ash, red cedar, hemlock, butternut, and hard maple, as well as many inferior woods, are still to be found in sufficient quantity for home consumption. A considerable supply of yellow birch still exists, and in some regions it is as yet almost untouched. The white pine, the great Canadian timber tree, has a more limited range than is generally supposed, and the principal reserves are in the region around Lake Temiscaming, and thence westward to the eastern shores of Lake Superior. When the exportable white and red pine have become exhausted, as must happen before many years, there are still vast quantities of spruce and larch, which may even now be regarded as the principal timber available for this purpose in the future. Tremendous havoc has been wrought by forest fires, and it is estimated that the quantity of red and white pine destroyed in this way in the Ottawa Valley and in the St. Maurice and Georgian Bay regions is many times greater than all that has been felled by the axe. Yet even this is insignificant compared with the quantity of pine, spruce, cedar, larch, balsam, and other trees which have been destroyed by fire in the more northern latitudes all the way from the Gulf of St. Lawrence to the Nelson River, and thence northwestward. The northern coniferous forests are more liable than others to be destroyed by fire. In the summer season, when the gummy tops of the trees and the mossy ground are alike dry, they burn with almost explosive rapidity. Small trees are thickly mingled with the larger ones, so that their branches touch each other, and thus form a sufficiently dense fuel to support a continuous sheet of flame on a grand scale. Before a high wind the fire sweeps on with a roaring noise, and at a rate which prevents the birds and beasts from escaping. After a time, shrubs and bushes spring up on the burnt area, then aspens and white birches, among which the cone-bearing trees begin to appear, and after a century and a half or more these will have regained possession. This alternation of crops of timber appears to have been going on for many centuries, but in modern times the fires have been more numerous than formerly. Occasionally due to lightning, these fires are mostly traceable to the carelessness of white men and demoralised Indians. The fires are not so liable to run in forests of full grown white and red pines, and hard wood forests are seldom burnt to any great extent. In several localities I noticed the weird sight presented by the charred and branchless trunks as they were left, dead and silent, after the fury of the fire had swept over them.

A Parliamentary Blue-book * contains the most recent official information on the forests of the several Provinces of the Dominion. In Prince Edward Island there are now no forests of any extent, they having all disappeared under the axes of the settler and the lumberman. In Nova Scotia, all or nearly all the timber lands will have been cut over for the first time by or perhaps before the year 1890. By careful husbanding, a second cut nearly equal to the first can in many localities be obtained after fifteen or twenty years, so that, if it were not for the forest fires, those lands which are well looked after would never become denuded of their timber. As it is, the supply of pine and spruce is rapidly approaching exhaustion, and the lumbering trade is on the decline. Large areas once covered with a stately growth of pine, spruce, and other trees, have been rendered almost barren by fires. No discretion is exercised, nor is any protection extended to the forests in Nova Scotia; every man may cut as he pleases.

The Province of Ontario contains 18,000 square miles of land, known as timber limits, that is, land on which lumbermen have purchased the right to cut lumber for a certain period, renewable yearly, and on which lumber, when cut, they also pay certain dues to Government in proportion to its amount. No data exist upon which to base an estimate as to how long it will take, at the present rate of consumption, to exhaust the timber of these lands. The Government lands, on which no licence to cut has yet been granted, are believed to contain about 20,000 square miles of forest, possessing much valuable and merchantable timber. Mr. P. White, M.P. for Renfrew, Ontario, estimates the value of the timber annually destroyed by forest fires in the Ottawa District at four million pounds sterling. Mr. Stewart Thayne, of Ottawa, a recognised authority on forestry, submitted to the Select Committee on Agriculture the following suggestions as to the duty of the Canadian Government:—

“The principal point upon which they might take action would be this: they should separate the lands which are known to be unprofitable for agriculture, and devote them exclusively to forestry purposes, or to the production of timber. We have lands of that character here. Up the Ottawa, for instance, settlers have been induced to go in and settle on the pine lands. There, after one or two crops, it will take more than the original value of the lands to make them produce again. After three or four crops, at the outside, the thin covering of the soil over the sand becomes utterly exhausted. These pine lands, and all the lands only fitted for the cultivation of pine and spruce, should be set apart for the cultivation of those trees. There are millions

* ‘Reports on the Forests of Canada. With Précis by Dr. Lyons, M.P., of certain papers submitted therewith.’ London: Printed by Eyre and Spottiswoode, 1885.

and millions of acres in Ontario and Quebec which could be made productive timber districts, but which will never be productive agricultural districts."

In the Province of Quebec, the Laurentian Forest Highlands, lying on the north of the St. Lawrence, occupy an area of 178,000 square miles, the greater portion of which, being fit for nothing else, must remain a timber-forest for ever, increasing in value as timber becomes more scarce elsewhere. It is capable of maintaining a sparse but hardy population in comparative comfort by the development of the resources of its mines, and of its forests, if cared for and preserved. Another forest-region in the Upper Ottawa territory covers an area of some 30,000 square miles. On account of its favourable geographical position along the banks of a great river, and the unfitness of much of its area for other cultivation, the Province of Quebec seems destined to remain a timber-yielding and timber-trading country. A Committee appointed by the American Forestry Congress, at its Montreal Meeting, recommended:—

1. The reservation of all pine and spruce lands, unfit for settlement, for lumbering purposes exclusively.
2. The prohibition of the burning of bush by settlers in the vicinity of fir trees during the months of May, June, September and October (burning in July and August being already interdicted in the Province of Quebec).
3. The division of the timber country into districts, and the appointment of police under a superintendent with magisterial powers, whose duty it shall be to detect and punish offenders, and provide for the extinguishment of fires.
4. The cost of the maintenance of this protection might partially be met by the imposition of a moderate tax on the parties owning or leasing timber lands.

In British Columbia, the southern and western portion is a densely wooded country, both mountains and plains being covered with thick and stately forests. To the north and east there is less timber, and that of inferior quality. The forests of economic value embrace an area situated between the Cascade range of mountains and the Pacific coast, and extending from lat. 49° N. to lat. 55° N., together with Vancouver and adjacent islands, and the Queen Charlotte group. The valuable Douglas pine, or red fir, covers that portion of the area indicated which extends between the southern boundary and a parallel drawn through the north extremity of Vancouver's Island. North of this northern line, and including the Queen Charlotte Islands, the Douglas fir is largely replaced by yellow cypress, red and white cedar, and white pine. The numerous and far-reaching inlets along the sea-board afford access to the forests, and greatly facilitate lumbering. The interior of British Columbia is but sparsely timbered, but the eastern portion, watered by the Columbia and Kootenay rivers and their tributaries, contains large areas of timber of great commercial value.

In New Brunswick there are 9000 square miles of forest area not under license, and 3500 miles under license.

The area of timber lands in the Dominion is estimated to cover in all about 280,000 square miles. In the United States, the timber lands yet remaining in possession of the Government occupy 132,000 square miles, representing, at the present rate of consumption, about 28 years' supply. The Hon. Geo. B. Loring, for many years Commissioner of Agriculture in the United States, is of opinion that in the course of one generation the forests of the United States will be almost entirely exhausted: in this case an active demand for Canadian timber is sure to spring up in the American market; so that unless the conservation of the forests of Canada is efficiently provided for by the Dominion authorities, this will be likely to constitute one more link in the chain of causes that are operating against the preservation of the forests of British North America. But the people of Canada appear now to be fully alive to the necessity of providing by legislative enactments against any further careless or reckless dealing with what should be one of the most permanent and valuable sources of revenue to the Dominion. Measures will probably be introduced providing for the setting aside of large districts for forest purposes, and for the regular maintenance of officials charged with the duty of preventing the occurrence of forest fires. At present, the Province of Quebec appears to take the lead in arboricultural legislation. The "arbour days," or tree-planting holidays of Quebec and New Brunswick, are deserving of speedy imitation in the other Provinces of the Dominion.

Canada is undoubtedly in need of one or more good schools of forestry, such as those which exist in France or Finland; and technical schools of this character should be established by the Government with as little delay as possible. It is well known that men who are selected by the Civil Service Examiners to enter the Woods and Forests Service of India, are required to spend a year or two in France, at the Forest School of Nancy, or at some similar institution, there to acquire that instruction in silviculture which their own country is unable to afford them. During several recent sessions, Sir John Lubbock, M.P., has brought under the notice of the House of Commons the utterly inadequate means this country possesses for the teaching of forestry, and last session obtained considerable support in his advocacy of the establishment of a forest school. In opposition to this proposal, it was urged that there are within the limits of the United Kingdom no woodlands of sufficient size to meet the requirements of such a school; but whether this be so or not, the objection is such as cannot possibly apply to Canada. The

conservation of the forests of the Dominion is a subject as much of imperial as of colonial interest, and it seems to me that the establishment of a thoroughly equipped forest school in Canada, the cost or part of the cost of which might be jointly borne by the Dominion and the Imperial Governments, would not only produce a number of well-trained foresters, under whose care the timber supply of the Dominion would be efficiently fostered, but would afford admirable means for training British foresters for service in distant parts of the empire. To acquire such technical training it would not then be necessary to repair to a foreign country, the instruction would be given in what is still the greatest forest region in the world, the school could be reached in less than a fortnight from any part of the United Kingdom, and cheap ocean fares and inexpensive living in the Canadian forest school would add to the attractiveness of such an institution.

Canada is so near to us that for some years past she has been represented at the Annual Meetings of the Royal Agricultural Society, where the Canadian exhibit is always a pleasing and instructive feature. The Dominion exhibit, under the care of Mr. John Dyke, of Liverpool, and Mr. Thomas Grahame, of Glasgow, comprises produce from all parts of Canada, and no doubt some readers will remember the monster Canadian cheese at Kilburn. The other exhibit, that of the Canadian Pacific Railway, is under the superintendence of Mr. Alexander Begg, and is concerned more particularly with the produce of the prairie. These exhibits are always worth inspection; but a far better way of becoming acquainted with the Dominion is to pay it a visit, a journey to Canada in the summer having now become an easy, pleasurable, and instructive trip, the ocean passage from Liverpool to Quebec not occupying more than eight or nine days. During the last two summers a considerable number of agriculturists, most of them combining business with pleasure, have visited the Dominion, and by means such as these the resources of Canada are bound to become better known and understood among us, and it is well that this should be so. It is perhaps worth mentioning here that on my return voyage in the Allan mail steamer, "Parisian," an impromptu meeting was convened in the saloon one afternoon, under the chairmanship of Lord George Hamilton, M.P., to discuss the question, "Is Canada a suitable field for emigration?" and the expression of opinion, which included that of General Sir J. H. Lefroy, R.A., F.R.S., whose knowledge of the Dominion extends back for nearly half a century, was almost unanimously in the affirmative.

I desire here to acknowledge my obligations and to express my

thanks to Mr. Joseph G. Colmer, Secretary of the Office of the High Commissioner for Canada, who has always most courteously aided me at all times when I have sought the benefit of his advice and experience.

CONCLUSION.

In seeking to arrive at some general conclusions respecting the present character and probable development of Canadian agriculture, it is necessary to bear in mind the fact that it is only within the last forty or fifty years that any agricultural progress worthy of the name has been effected in Canada. Still more important is it to remember that the work of clearing the forest lands, opening up the country, and bringing the soil under cultivation, was originally performed by men who had little else than their muscles and their native courage to rely upon,—by hardy pioneers with little or no capital, who left their native shores with the brave determination to hew out from “the forest primeval” the means whereby they might acquire wealth and independence. It is perhaps regrettable that the extension of agriculture in the Dominion should be inseparable from the destruction of its forests; this was, of course, to a certain extent inevitable, but I have endeavoured to show that under a proper system of conservancy much of the existing forest areas may be preserved as sources of revenue for ever. The establishment of such forest conservancy should be no longer delayed. Many of the pioneers, to whom I have just referred, have advanced to leading positions in the administration of the affairs of the Dominion, and it is only in accordance with natural law that their sons should be worthy successors of such sires.

The increase of population has, owing to immigration, been much more rapid in Canada than is generally supposed, and, in this connection, the Dominion compares favourably with the great English-speaking nation which has effected so remarkable a development of the southern half of the North American Continent. Thus, in 1776, the United States contained about 3,900,000 inhabitants, and in 1881 about 50,000,000, showing an increase of some 1200 per cent. Canada, at the census of 1784, did not muster 150,000 people, whereas in 1881 the number had advanced to 4,324,810, an addition of nearly 3000 per cent. Moreover, since 1830, when both countries began to experience the effects of the tide of immigration from Europe, Canada has shown an increase of about 480 per cent., while that of the United States has been about 390 per cent. In other words, Canada has in the space of the last half century

increased her population five-fold, and the United States in the same period four-fold.

There are three points of contact between Canadian and British agriculture, which, in their commercial importance, are probably far superior to all others. These are represented respectively by the grain trade, the cattle trade, and the trade in dairy produce, or, to be more exact, the cheese trade. It is so elementary a fact that our own country is quite incapable of growing sufficient wheat for home consumption, that it is quite axiomatic to add that the additional supply must be derived from beyond the seas. A few years ago it seemed a safe statement to make that Canada would constitute the future granary of the mother country. The United States then appeared to be the most formidable rival of the Dominion, but the rapidly increasing demands of her own population have led to a remarkable falling off in the exports of wheat from that country to the United Kingdom during the last two years. America's need, however, has not proved to be Canada's opportunity, for another rival in a distant quarter of the globe has put in strong claims to be considered a controlling factor in the English wheat market, and, from a national or imperial point of view at any rate, the wheat-exporting power of British India constitutes a development of the resources of the Empire which it is pleasant to contemplate. As illustrating the point under notice, the following figures may prove of interest:—

IMPORTS of WHEAT into the UNITED KINGDOM from the UNITED STATES, BRITISH NORTH AMERICA, and BRITISH INDIA, and the TOTAL IMPORTS of WHEAT from all Sources, from 1874 to 1884.

	United States.	British North America.	British India.	From all Sources.
	Cwts.	Cwts.	Cwts.	Cwts.
1874	23,048,552	3,807,174	1,076,876	41,479,460
1875	23,463,910	3,604,610	1,334,943	51,786,393
1876	19,299,785	2,417,151	3,279,887	44,394,152
1877	21,308,667	2,912,178	6,104,940	54,162,888
1878	28,963,901	2,603,586	1,819,304	49,811,643
1879	35,976,805	4,676,686	887,256	59,368,140
1880	36,089,869	3,893,544	3,247,242	55,197,304
1881	86,038,074	2,860,854	7,308,842	57,042,669
1882	35,059,623	2,684,828	8,477,479	64,171,622
1883	26,065,832	1,798,056	11,243,497	64,080,444
1884	22,606,130	1,757,406	8,009,909	47,113,998

Thus, while the United States sent us an almost uniform quantity of wheat during the four years 1879–1882, she sent us nearly one-third less in 1883, and less again in 1884. The

import of wheat from Canada has been steadily falling off since 1879, while since the same year the import from British India has been rapidly increasing; for though the total quantity derived from India in 1884 was three million cwts. less than in the preceding year, yet the ratio to the total imports of wheat from all sources was in the two years practically identical; but this reservation applies, of course, with equal force to the United States and Canada, for it will be seen that the aggregate import of wheat from all sources into the United Kingdom in 1884 was less than in any of the preceding seven years. If, as is not unlikely, the home demands of the United States lead to still further restriction in the quantity of wheat she may have for exportation, the result may be not only a diminution in the power of the most formidable rival Canada has to meet in the English wheat market; but it is even possible, as statements made in the first part of this paper seem to suggest, that at some perhaps not far distant time, the United States herself may become a wheat-importing country, and Canada would be in the best position to meet such a demand. It is evident enough that in the Dominion the cultivation of wheat on an extensive scale is moving westward; the low average yield of, for example, the Province of Quebec—9 to 10 bushels per acre—cannot fail to be discouraging in the face of recent low quotations. To what extent the wheat-growing capacity of Manitoba and the great North-west will be put to the test depends very largely upon the prospective market which the prairie-grown wheat is likely to command; but I have already given my reasons why mixed farming rather than mere wheat-raising will probably prove to be the safer course for the prairie farmer to pursue. The variety of Red Fyfe Wheat, known as No. 1 Hard, which grows to such perfection on the soils of the Red River Valley and of more distant parts of the prairie, seems likely, on account of its excellent milling properties, which increase in favour as they become better known, to meet with an increasing demand; and as wheat of this quality cannot be raised in the more southern latitudes beyond the international boundary, the farmers of the Canadian prairies are in possession of a monopoly which is likely to remain undisturbed.

The rapid growth of the Canadian cattle-trade is remarkable, and though it has had the effect of cheapening meat in the English market, it must nevertheless be remembered, that breeders at home have been distinctly benefited by the steady demand for pedigree stock of all kinds; and this is a demand which is likely to continue. How potent and beneficent has been the influence of pedigree-stock taken out from Britain by Canadian breeders is sufficiently shown by the fact that the

average value per head of horned cattle exported from Canada increased from 5*l.* in 1874, to 13*l.* in 1884, though, of course, the reduction in the cost of transportation, and the better and more rapid methods of transit, have not been without their influence in this direction. The following Table shows the total exports of cattle and sheep from Canada in the years 1874 and 1884 respectively :—

	CATTLE.		SHEEP.	
	Number.	Value.	Number.	Value.
1884	90,664	£ 1,182,578	364,474	£ 309,230
1874	39,623	190,254	252,081	140,513
Increase during the decade	51,041	992,324	52,393	168,717

This great trade in living animals has only been rendered possible by the clean bill of health which the Dominion enjoys ; and I have shown what scrupulous care is taken to preserve this precious privilege.

As regards the dairy industry, the present position of the Canadian cheese trade can hardly be regarded as other than highly creditable to the Dominion, demonstrating, as it does, how successful cheese-makers have become in their efforts to produce a superior article of uniform quality. It is just the reverse with the butter-making industry ; but it must be apparent, from what has been stated under this head, that Canadian dairy-farmers are fully aware of their inferiority as butter-makers, and that measures which are now in progress will doubtless, in a few years' time, effect a needed and salutary change in the quality, and consequently in the quantity, of Canadian butter available for export. The following figures present a picture of the fluctuations in the trade in Canadian dairy produce during the last decade :—

TOTAL EXPORTS OF CHEESE and BUTTER from CANADA.

	CHEESE.			BUTTER.	
	Lbs.	Value.		Lbs.	Value.
1884	75,835,557	£ 1,564,724	1884 ..	8,473,976	£ 334,958
1874	24,050,982	704,640	1874 ..	12,233,046	524,061
Increase ..	51,784,575	860,084	Decrease	3,759,070	189,108

Thus, while the value of the exports of cheese has more than doubled during the decade, the value of the butter export has fallen off nearly 40 per cent. in the same period.

Hitherto, agriculture has been the main industry of Canada, and, in so young a country, it will probably for some time remain so. The great lumbering trade of the older provinces is less than it was, and the decline in wooden ship-building must make itself felt in New Brunswick and Nova Scotia. The magnificent facilities for transport the Dominion possesses in its splendid rivers and lakes, have no doubt greatly accelerated the removal of the forests; but these facilities, supplemented by such great arteries of railway communication as are afforded by the Grand Trunk, Intercolonial, and Canadian Pacific systems, have resulted in placing the Canadian farmer, even though his dwelling may be on the distant prairie, in close contact with the great markets of the world. Indeed it is not too much to say that, but for the opening up of the great North-West by the Canadian Pacific Railway, the colonisation and development of the prairies of British North America must have been indefinitely postponed. Even now, more railways are needed out west, to tap the resources of the fertile valley of the great Saskatchewan, and to put Winnipeg in communication with the southern coast of Hudson's Bay. The western prairies of the United States have been accessible since 1840, while those of Canada were first reached by railway only about five years ago.

The pioneers in Canadian agriculture were, in most cases, men who possessed but little knowledge of farming, and their number has been steadily increased by the accession of others whose knowledge was similarly defective; and it is but fair, in passing judgment upon the present condition of farming in the Dominion, to bear this fact in mind. That some generally applicable system of instruction in the theory and practice of modern agriculture would exert a powerful influence for the better is beyond doubt. That the Canadian farmers recognise the weakness of their position in this respect is sufficiently evidenced by the tone of the replies obtained by the Select Committee on Agriculture, the majority of which were in favour of the establishment of a Central Bureau, of an Agricultural Experimental Farm, and of a department devoted to Agricultural Statistics, besides advocating the circulation of handbooks and reports, and the issue of crop bulletins. It is much to be hoped that before long these suggestions will be realised, and that the Central Bureau will be supplemented by a local one in each Province. The Canadian Government, however, has not been unmindful of the agricultural interests of the Dominion; and in a young, and therefore a poor, country it has, by subsi-

dising the local agricultural societies, made it possible to stimulate enterprise and excite emulation among the farmers by the offer of prizes at the agricultural exhibitions. The value of these competitive shows is well illustrated in the marked and rapid improvement of the live-stock of the Dominion, and in the production of the Red Fyfe variety of wheat.

As the United States become more densely peopled, Canada will probably find there an outlet for some of her agricultural produce. She will spare no effort to maintain the position she has won for herself in the trans-oceanic cattle trade, while she will endeavour to supply in the wheat-trade the short-comings of the United States, whose export to this country is so visibly declining,—her great competitor in this field will be British India. With a superior article of butter, such as she is well capable of producing, she is advantageously placed for challenging the Danish trade with the West Indies, whither Denmark sends large exports of butter in hermetically sealed tins.

Nothing, I think, would have so salutary an effect on the agricultural practice of the Dominion as an influx of settlers of good farming experience. And what Canada most needs for the development of her great resources is increased capital, which would serve not only to extend her agricultural operations, but would assist in the development of her mineral wealth, and in the establishment of manufactories.

Canada is the nearest British colony. There is probably not a large town, certainly not a county, in the old country which has not supplied its quota, small or large, to the present population of the Dominion. The feeling of kinship on the one hand, and the growth in commercial relations on the other, are continually helping to bind the two countries closer together. To the agriculturist and the capitalist, to the political economist and the philanthropist, Canada, with her past so brief, and her future so pregnant with promise, presents a problem which for interest has never been surpassed. The greatest prejudice the Dominion has to live down is that connected with its climate, and all the unpleasant forebodings which were once uttered with respect to the older Provinces are now lightly transferred to the prairie. But, just as the Eastern Provinces are filling up with a healthy population, so I cannot help believing will be the case with the new lands farther west. I will even go a step farther, and submit that the offspring of the British people who are born and bred under the clear northern sky of the Canadian Dominion, with its undoubtedly severe climate, will in the course of generations develop into a finer, hardier, healthier race than descendants of the same people can hope to become in the lower latitudes of the same continent.

Natural history repeats itself as well as political history, and men are very much what their physical environment makes them.

I have endeavoured to present a picture of the Canadian Agriculture of to-day. At some future time another pen than mine will perhaps write its history again, and the progress recorded will probably be great. If I have erred in the discharge of my task, I believe the severest critic will hardly assert it to have been in the employment of colours of too brilliant a hue. But I am free to confess that I have sometimes had to repress an enthusiasm—pardonable I hope—born of my admiration of the persevering struggles of the men of our own race, and language, and aspirations, who, in the land of the beaver and the buffalo, have founded a civilization and established a great agricultural colony; whose people are imbued with an ardent and unselfish loyalty to the country whence they sprang, the spirit of which is reciprocated on this side of the Atlantic, and will, I hope, constitute for ever a bond of union between the mother country and the noble heritage which belongs to her sons and daughters in the Western Hemisphere. The completion of the Canadian Pacific Railway, which unites with a steel band the Atlantic and Pacific coasts of the Dominion of Canada, inaugurates a new era of peaceful conquest. As the years roll on, the pioneers of an improving and progressive Agriculture will move in increasing numbers in the direction of the setting sun, and establish new monuments of British industry and British enterprise on those lonely and distant prairies in the North West where, as yet,

“Grasses that never knew a scythe
Wave all the summer long.”

XVII.—*Guenon's System of Selecting Cows by the Escutcheon.* By WILLIS P. HAZARD, Secretary of the Pennsylvania Guenon Commission, West Chester, Pa.

[Reprinted from the Report of the Pennsylvania State Board of Agriculture for 1883, pp. 112–132. Harrisburg, 1884.]

IN the volume of Agricultural Reports of Pennsylvania for 1878, will be found the report of a commission appointed by Governor Hartranft, at the solicitation of the State Board of Agriculture, to examine into the value of the system of M. Guenon for ascertaining, by outward marks, the true value of every cow, calf, or bull. The constant and growing demand

for copies of that report shows that the attention of the farming community has been awakened to the great value of the system. The State was importuned to print another ten thousand copies of the report, but declined ; and to supply the demand for a greater elucidation, the book 'How to Select Cows,' was issued, so that up to this time thirty thousand copies of the two articles have been issued, until now the word escutcheon is, at least, well known by every intelligent farmer, if its interpretation is not practically applied. No animal of any importance is now advertised for sale without stating what grade of escutcheon it bears. Thus the work of this Board is bearing its fruit, and it is not too much to say that, in its practical results, it has elevated the grade of stock throughout the United States ; has caused the selections to be more accurately made ; has saved farmers many thousands of dollars, and been the cause of consigning many a worthless animal to the butcher that would otherwise have been raised at a loss.

As the word escutcheon, and the theory connected with it, was first applied by Guenon, his system has been popularly called the "Escutcheon System," and by unbelievers it has met with some derision, because they supposed, without studying Guenon's book, that that was the only point he made as a guide to the judgment of the farmer. Guenon judged by ten points, and, in order that the system should be properly placed before the farmers of this State in the twenty-five thousand copies of the report that are distributed, I have prepared this condensed statement of the leading points :

Proper Selection.—Every one has his own views about this. One will choose by the crumpled horn, the capacious, thin-skinned udder, the large milk-veins, and their entrance into the belly, the colour and texture of the skin ; while another will judge by the feminine appearance, the wedge-shape, the yellow ears, the small head, and the broad muzzle, or by some other favourite method. Yet, with all the marks, every dairyman will occasionally purchase an animal that deceives him at the milk-pail or cream-pot, and she is apt to be the handsome one. The system of Monsieur Guenon does not interfere with any of these modes of judging ; it simply harmonizes with, and becomes an adjunct to them. Now, if we have one, three, five, or six points by which to judge the value of an animal, why not add to them still one more, especially if that one is worth more than all the others put together ? With none of these modes can we tell just what a cow will do ; with all of them combined we may select a pretty good cow, and at other times we may not ; but by the escutcheon marks, and the other points by which Guenon judged, we can very surely tell whether the cow about to be

purchased is a good one, how much milk she will give, how much butter she will make, and how long she will milk. In these times, when competition is so keen in the butter and cheese market, it behoves every man to understand his business, and have his herd of the best. The cow is his best machine ; and the old adage of "goods well bought are half sold" applies here perfectly. A well-selected cow will always prove a profitable investment. This system will enable any one to tell the cow which is going to fail in her milk, and go dry for too long a time to be profitable ; and it should be acquired, if only for that purpose.

Sketch of Guenon.—First, let us see who Guenon was. Guenon as a boy was a young cowherd, living near Libourne, in France. His father, a gardener, had early taught his son the varieties of plants, and thus he was led to notice the classifications and kinds of fruits and plants. He studied the works of the best writers on botany and agriculture, and applied his knowledge by following up all the ramifications of the vegetable kingdom, studied their external signs, and ascertained their qualities and productiveness. His mind was thus trained for developing his after-discoveries.

When he had the care of cows as a cowherd, he took them to and from the pasture, and watched them all day ; for in France, having no fences, the children, in turn, watch their own and their neighbours' cows. Thus various breeds and qualities of cows were constantly under his eye. A thoughtful lad, he was one day rubbing them down, when he noticed the difference in the hair, parts of it running upward, contrary to the usual growth of hair on the animal. In addition to the significance of the variations in the leaves and kinds of plants, he had heard mentioned some quirls in the hair, and other signs, which were said to have some significance. The thought struck him, could there be any visible marks denoting different values ? The thought once raised, he pursued it from day to day, from year to year, all the time discovering new points, which finally led him to believe he had made important discoveries. Like the learner of the present day, he met many things which frequently made him doubt, and which were great drawbacks to the system of classification he was endeavouring to form from the yet conflicting appearances.

His attention to the matter having first been drawn by the dandruff on certain spots on the hind-parts of the cows and the variations of the hair, in pursuing these inquiries he found a great variety in the *shapes* of these quirls. This led to a new train of reflection and observation, which resulted in his becoming convinced that these shapes were the signs by

which to distinguish cows, and to know their good and bad qualities.

After years of perseverance, he got his ideas into such a fixed arrangement that he was emboldened to give it to the world, and stand the scrutinizing tests of committees of various agricultural societies. The result was shown in the many orders for his book, the medals and membership certificates of the leading societies, and a pension from the government of three thousand francs for life. The value of the system was established. It has spread into every country where agriculture is encouraged, and his work has been frequently translated.

His system was based upon the discovery that on the posteriors of the bovine race, reaching from the vulva, and extending down over the udder and on the inside of the thighs, a portion of the hair grew upwards, and was easily distinguished from the surrounding hair growing downwards. In so doing, the upward hair takes different shapes, which he called escutcheons. The size and shape of these indicate the quantity of milk the cow will give and the length of time she will continue to milk after calving. This latter was also affected by certain tufts of coarse hair or blemishes on the escutcheon.

Then he noticed the character of the hair growing upon the escutcheon, the colour of the skin under it, and the quality of the skin. It depends upon the quality of the hair and skin to define the quality or richness of milk the animal will give.

Particular attention must be given to these points, for they have a great bearing on the judgment to be formed; and the escutcheon is only to be judged in connection with these and other points.

The rules of the system are as applicable to calves and bulls as to cows; for by them can be told, after three months, whether it will pay to raise the calf, or to dispose of it,—if a cow calf, whether it promises either or both quantity and quality; if a bull calf, whether his “get” is likely to prove valuable. In either sex, the young should be judged by class and size of escutcheon, by the colour and texture of the skin and hair. Thus a saving is effected in not being at the expense of raising a poor calf, and not being disappointed in future results. From this ability to raise or purchase only the best, the improvement of the herds will be very great, and we shall breed only the best.

The main theory of Guenon was, that in a good animal a number of points would be discernible, which would enable any one to select the good from the bad. So far from judging by one mark alone—the escutcheon, as it is generally stated—he expressly declares that ten points must conform to make a first-class animal, and these must be supplemented by several minor

matters to enable the judge to estimate the true value of the animal.

We may summarize these points of judgment thus: 1. The skin. 2. The hair. 3. The conformation. 4. The age. 5. The period of gestation. 6. The health. 7. The feed. 8. The breed. 9. The size. 10. The escutcheon.

Until he had become acquainted with these matters he would not undertake to say how much milk a cow would give; how long she would give it, nor of what quality. When he did know these points, his judgment was infallible, as numerous public tests he made proved, and as the testimony given by committees of all the leading agricultural societies of his country declared and testified.

1. *The Skin*, he said, must be fairly thin, mellow, oleaginous, and of a rich nankeen or golden colour, particularly about the udder. If it was such, the unctuous character of it would be indicated by a dandruff, which, when exuded, would dry, and could be rubbed off. The skin is one of the best tests, both in the feel or handling and the colour. A truly rich animal, no matter of what breed, will show on the inside of the ears, around the eyes and the muzzle, on the protuberances under the lower jaw, inside of the thighs, back of the shoulder, and at the root of the tail, as well as at the end of it, a rich golden colour; and if there is any white hair on the top of the shoulders, over the loins, or on the connecting skin between the leg and the body, it may readily be seen by lifting the hair. With all this mellowness and colour can readily be perceived the cause of it, upon handling the animal, viz.: The rich unctuous fat exuding through the pores, which will make the hands feel greasy, or as if they had been handling soap. The skin of the udder will be found soft and thin, much like the feeling of a fine kid glove; it will not be drawn tight over the contents of the udder, but be loose and wrinkled, indicating a capability of stretching with the increased contents of the udder when full. Beware of a cow with a white, thick, unpliant skin, with coarse, harsh hair, particularly on the back of the udder. Such white skins are usually free of any rich dandruff. If the milk is plenty, it will be thin, blue, serous.

2. *The Hair*.—As a rule, the hair should be soft and fine. Guenon's rule is, the hair must be short, soft, silky, or furry. The same unctuousness that mellows the hide will soften the hair, for the follicles will be filled with fatty particles and be absorbed by the hair, which will soften it. Generally, where this is the case, there will be but little hair upon the udder, and that very short. The best butter-cows will have very short thin hair. Those cows that have long, harsh, wiry hair, will usually

have plenty of it—much upon the top of the shoulders, and frequently upon the udder. Upon the latter, if the hair is plenty, and particularly if upon the upper part, or the perineum, the hairs are long, harsh, and staring at you, the milk, even if plentiful, will be serous and devoid of colour or butter, and often the cow will dry off much sooner than profitable, and not be a very sure breeder.

3. *The Conformation.*—The shape of a good cow should be such as to show that she is made for the work she is to perform ; she should have a motherly, a female appearance, as distinctly marked from any masculine tendency. She should be as strongly marked in her different shape from that of the bull, as a woman is from a man. In the male we look for a good, strong, broad head, firmly set, by a thick, stout neck, upon a good pair of shoulders, with short, firm, but waxy horns, and a bright, lively eye, easily fired up when called upon to do his duty. With the female we should look for a small, neat head, set upon a rather thin, pretty neck, upon fairly rounded shoulders, with nice, thin, rather crumpled horns, preferably pointed inwards and downwards, waxy and golden, with a tendency to a dishing of the face, and with a mild but bright eye, and a muzzle indicating good breathing powers. The chest, in either sex, should indicate the possession of good respiratory organs. The barrel of the cow should be large and deep, the ribs standing or hanging from the chine in the shape of a horse-collar ; this will, in a heavy milker, generally make the ridge bone rather prominent and sharp, than broad ; sometimes the chine is double, which is always a good sign ; if, about the centre of the back-bone, there are three depressions in which you can lay your three fingers, this is an additional merit ; all these signs indicate a loosely made cow, so that she is ready fitted to do her work. The back should be straight, and so running out to the root of the tail, which will allow the tail to hang squarely down and free from the body ; the tail-bones, with its cartilaginous attachment, should extend down to at least the point of the hock, and as much below it as possible, adorned with a neat curly switch. The loins should be broad, and the haunch and pelvic bones wide apart, and from the haunch, or hip-bones, to the end of the pelvic bones a liberal distance ; with all these points right, the delivery of the calf will be easy, and they indicate not only the capability, but the likelihood of large calves. Short, neat, trim legs are important, because with short legs we generally find a large, deep barrel, which has less “daylight” under it, indicating good digestive organs, a good feeder, and a capacity for carrying a large, healthy calf.

Then, with a cow having all the good points, we may naturally expect to see double, large, prominent, knotty, and zigzag veins—commonly called milk-veins—leading to a large capacious udder, capable of holding the great quantity of milk which such an animal is likely to make.

The udder should be as nearly level at the under side as possible, and stretching forward nearly level with the belly, not “cut away” in the forward quarters, nor hanging down unevenly in the hinder quarters. If the thighs are wide apart, they will allow the expansion of the udder behind, so that the wrinkles of the skin, when the cow is milked out clean, may again expand when the udder is full and flush with milk. The udder should not be fleshy, nor the outer skin thick, nor covered with long or coarse hair; in a first-class udder we expect it to collapse to “a rag” when milked out. The teats should be of medium size, not too large to be ungainly or more than filling the hand, nor too small to be easily handled, even by a large hand. Evenly placed on the udder, and not “strutting” too much. Such points as we have mentioned above are what Guenon would look for when judging of the cow's conformation.

4. *The Age.*—Guenon and all good judges of cattle would take into consideration the age of cows. As a heifer, with her first calf, she cannot be expected to give as much milk or make as much butter as with her second calf; nor with her second as much as with her third calf. Heifers should not be allowed to calve before they are two years old, nor, better, before they are two and one half years of age. They may be considered to be in their prime from five until eight years of age.

The age of cows is judged by the teeth, the horns, and by the general appearance. In the upper jaw cattle have no incisors; in the lower jaw they have eight. At birth the calf generally has four incisors. On the seventh or ninth day it loses the umbilicus. At three months the other four incisors appear, two on each side of the first four. Towards the end of the first year the two middle milk-incisors fall out, and are replaced in about a fortnight by two others. Towards the end of the second year the next two fall out; towards the end of the third year those next to the former, and towards the end of the fourth year the last two. All these teeth are replaced by new ones, which are easily distinguished from the original teeth by their size and lustre. However, the teeth of cattle, especially when brought up in a stable, do not change as regularly as those of horses or sheep. At five years the second teeth commence to alter in the same order in which they had appeared, although not with perfect regularity. The older the cattle, the more elongated, duller, darker, and looser do their teeth be-

come ; at the age of sixteen or eighteen the teeth have generally fallen out. At this period the age can be determined with more or less certainty by the horns.

Until the end of the third year the horns are smooth ; from this period a ring elevation forms around them near the head, and a new ring forms after this period with every year. A smooth horn counts for two years ; one ring for three years ; and to every ring one additional year is reckoned. According to this calculation an animal with seven rings is nine years old. In the ox these rings are less distinct than in the cow. This may, perhaps, be partly owing to her gestating ; for, during the year that a cow is without calf, no ring forms on her horns, or, if a ring forms, it is scarcely perceptible. In such a case the interval between the two rings is twice as large as usual, and counts for two years. If the rings should not be very distinct, we may judge of the age of the animals by the condition of the horns themselves, which become thinner towards their roots in proportion as the animals approach their full growth. Horned cattle may attain to the age of twenty years without, however, remaining equally useful.

5. *The Period of Gestation.*—Nine months is the general period for this process of nature, though it is usually exceeded by one or two weeks, two hundred and eighty days being the ascertained average. The cow in her wild or natural state would most probably conceive again three weeks after dropping her calf ; and as nature demands that all the resources of the cow's being shall be devoted to developing the new foetus, and the milk undergoes a slight change for that purpose, she would nourish her calf for about eight weeks, and partially for two months longer, and the milk would soon thereafter dry up, in order that she should not be carrying on two processes at once. But civilization has effected great changes in her nature, and we force her to develop both operations at one time, viz., her milking and breeding duties. To do this we are obliged to be regular in the milking and feeding, and feeding heavier and more constantly than she would be able to do in an untamed state. This stimulation perverts her nature and develops the lacteal glands and the udder to hold the increased quantity of milk to an enormous extent. Therefore we find many cows, and all, more or less, very much more developed than they would be in a state of nature.

Now, this process of cessation of milk in order to develop the new foetus is certain and continuous, and the milk diminishes more or less from the impregnation. With some the lacteal glands have become so developed that the animal never entirely ceases to give milk between one calf and another. However

desirable this may be for the milkman, it is an unnatural and forced condition for the animal, and, if possible, she should be "dried off" at least from four to six weeks before calving, to give her needed rest. Such cows will occasionally have a year when the owner will say she is not doing as well as usual, and this is some transient trouble or disease, or natural endeavouring to recuperate. Other cows again, most generally those of robust nature, and coarser make, will commence almost at once to fall off in their quantity, and devote their energies to the development of the fœtus instead. These animals Guenon denominated "bastard," a term, as we generally understand it, not exactly applicable, but as it also means "spurious," "false," we will understand it in that sense. Of course this character of cow, failing so rapidly in her yield, is less valuable than one that brings forth her healthy young, and yet gives plenty of milk in the meanwhile. This is one of the great values of the Guenon system, that it enables one to perceive, select, and discard cows of a spurious character. By the coarse, masculine form, by the harsh, wiry hair, by the dry and dandruffless skin, and, above all, by the escutcheon, Guenon points out how to avoid purchasing such stock. So that of the two buyers, he who has mastered the system will buy the less handsome but more valuable cow, while the ignoramus will buy the more beautiful and more worthless stock at a higher price.

Thus it will be seen the importance of the judge knowing how far in gestation the animal has progressed, in stating the quantity the cow will yield, and the length of time the animal will continue to milk. The size and shape of the escutcheon will tell both; but the yield is modified by circumstances, and by the other points.

6. *The Health* of the cow was made another point in judging by Guenon. If the cow is viewed as a machine, it is evident that it will run more perfectly if all its parts are in good condition, and supple from being well oiled, than it would if choked up with dirt or accumulations. A cow in best health is evidenced by a clear eye, a healthy skin, a fine coat of hair, a good quick step, and an excellent appetite. Whether she is breeding or milking, her health will have an important influence upon both. Her milk will be rich, and not serous, or blue and watery. If Doctor Sturtevant's theory is true, that the colouring of the milk is derived from the daily throwing off certain glandular cells, a healthy cow performing its functions well will throw off larger cells and containing more fatty matter, and thus enrich the milk more than an unhealthy animal. This is evidenced not only by the different amounts of butter yielded from different animals, but by the varied flavour of milk. To

those who can appreciate good milk, the flavour and body of some milk is far superior to that of others; and this, too, independent of the varied quality of the several breeds. The foetus, too, will grow larger, and make a finer and healthier calf than from an unhealthy animal.

It is evident, therefore, the health of the animal should be taken into consideration, especially in estimating the quality as well as the quantity of the yield.

7. *The Food.*—To maintain a cow in good health, and to get from her the greatest returns for profit, it is evident she must be well fed, and intelligently fed. To be well fed she must have sufficient to satisfy her appetite and to fulfil the demands made upon her. In the majority of cases the feeder as he passes along the different stalls will give to each cow about the same quantity of food, never considering that there are gross feeders as well as delicate feeders among animals as there are among men. That some are stronger, larger, and healthier than others. That some yield much more than others. There are always certain cows that take better care of themselves than they do of their masters. In other words, these cows will give less milk and keep themselves in better condition than other cows. Now, if a cow is constitutionally right, and can digest thirty pounds of hay with six quarts of meal a day, and yield a proportionate amount of milk and butter, she may pay a great deal better profit than one that eats less and pays less. The good worker and eater should have more than the poorer worker; they should not be treated alike.

To feed intelligently requires this discrimination, which may be made by ascertaining the yields of every cow in the herd, and testing each one by various amounts of food. Also, by studying by practice, and from the analyses of experts, the different values of various foods, and the proper combinations of the several kinds of foods. The scientists of the German experiment stations have proved that up to a certain point special foods may be given to produce certain results, but beyond that point it would not be profitable to increase that food. This proves that the system may take and assimilate and convert food to a profit in changing it into a marketable product, but that after a certain stage the extra amount of food is no longer assimilated and profitably converted. These results may be proved for himself by any farmer. His first step would be to study the values of different foods. He will find one will make more muscle, another one more fat, another one more milk, and so on. He will find, too, the different combinations and proportions to feed them in to be the most valuable to him.

Now, Guenon knew he might go into one herd, and after

examining one of the cows, and ascertaining how it was fed, and hearing the results, and comparing this with his own knowledge of what such a cow should do, could the more safely base his calculations of what all the other cows of that herd would do.

8. *The Breed.*—Guenon, by a long course of attention to the yields of different breeds, knew that one breed on an average would give more milk than another breed, while those of another breed might give less milk but more butter; also, he had learned the indications as to quality. Thus he could safely judge the quantity of milk and the quality of it, or in other words the quantity of butter such milk would make. Thus it was important he should judge by the breed as one of his points.

9. *The Size.*—Each pure-bred animal must, to a certain extent, conform to the average size of that breed, but there are three weights that we may and he did divide them into; they are the large, of five hundred and fifty to six hundred and fifty pounds, *dressed weight*; the medium, of three hundred and twenty-five to four hundred and fifty pounds, and the small, one hundred and ten to two hundred and twenty-five pounds. If the cow is viewed as a machine, we must expect no more from her than we would from machines. A small engine is rated as a two-horse power; a medium size, say, at four-horse power; and a large one at six-horse power; or, to make the comparison from ourselves, we do not all eat alike; a small, moderate eating man we do not expect to do as much work in lifting, pulling, or other heavy work as a larger, more powerful man consuming much more. Thus, applying the same facts to cows, we may reasonably expect the same results from them, for the laws of nature are the same through every branch of the animal kingdom. Therefore, in judging cows the size of the animal must influence our estimate of them, not only in one breed from another, as the Jersey from the Friesian, but in specimens of the same breed, for the breed and the size will always modify the quantity to raise or to lower it. The large may give twenty-four quarts, the medium nineteen quarts, the small fourteen quarts, though all may have the same character of escutcheon.

10. *The Escutcheon.*—I have named this last, while most people would name it as the first and only point of Guenon's system, because he was the first to classify and give significance to the various shapes in which it shows itself.

I hold that it would be very unsafe, and certainly very unfair to Guenon, to judge animals only by that one of his ten points. For all the other points I have explained he thought, and I think, very necessary to form an infallible opinion of the animal. But with the other points in conjunction a knowledge of the escutcheon is invaluable. It is the best outward indication of

the inward merits of the animal. Not because the shape of it is different on one animal from that on another, not because it is a cause, but that it is an effect of cause, and where you find the cause you will find the effect. Thus, I have never seen a cow with a first-class escutcheon that was a poor cow, nor have I ever seen a cow with a poor escutcheon that was a good one, especially when it was unaccompanied by a majority of the other points always found with a good escutcheon. You may then ask what object is gained by learning about the escutcheons if the other points show the animal's true character; and I may ask why eat a full meal instead of a partial one? Your judgment may be wrong as to whether it will last you until you get another one; or if impecunious, you were offered a hatful of gold, and you took out two or three coins instead of a handful, would it be wise?

I have generally found they who denounced Guenon's system had not studied it, and in many cases they could not even tell the names of the different escutcheons, and certainly did not know Guenon judged by ten points instead of one.

GUENON'S CLASSIFICATION.

In the last revised edition of Guenon's book he revised the whole system, simplifying and improving it. He classifies the various shapes of the escutcheons into TEN CLASSES. Each one of these ten classes has SIX ORDERS.* Each class represents a gradual reduction in the quantity given, and each order represents a gradual reduction in the time: so that a cow of the *first class* and *first order* will represent a very much larger escutcheon of the *Flanders* shape, and a larger number of quarts, and a longer time for milking than the *first class* and *sixth order*. And the first class, first order, will give twenty quarts, and milk nine months; while the cow of tenth class and sixth order will only give three quarts and milk three months. The one is most valuable, while the other is utterly worthless. If the system enables the purchaser to pick out the one, and to discard the other, it will need no one to praise it to him.

Guenon thus made the *perfect* shape the representative escutcheon of its class; and just so much as it varies from that, and gets smaller, just so fast does it descend in the *orders* of that *class*. Suppose the *first order* of every class should represent one hundred, then the next size smaller in that class may be represented by ninety, the next by eighty, and the fourth order

* It will probably aid the reader to comprehend the classification by regarding the term "Class" to refer to the *shape* of the escutcheon, and the term "Order" to refer to its *size*. (See Figs. 1-12, pp. 478-484.)—EDIT.

by sixty; for they drop much faster, in proportion, as they descend in the class to the sixth order.

Now, as a general rule, it is safest not to buy a cow below the fourth order of any class, and, of most of them, unsafe below the third order.

The ten classes and six orders are represented by sixty escutcheons, and to each class there is a bastard escutcheon, making ten more, or seventy, to which we may add ten classes of bulls of three orders each, or thirty, making in all a hundred varieties of escutcheons to learn. But omitting the orders below the third, as they are not necessary to be learned, reduces them by thirty; and as the bastards are exactly the same, with only two varieties of bastard-marks, we need learn but two, so that cuts off eight more; then, as the bulls are marked the same as the cows, we cut off thirty more; so that the hundred is reduced to only thirty-two that it is necessary to be well acquainted with.

These we simplify again by calling your attention to the fact that the thigh-escutcheons are all very much alike; therefore, when you have learned one, you have learned all, the only difference being the reduced size and some imperfections. It is the *vertical* portion that decides the class in which the cow is to be ranked; therefore you will become familiar with the ten vertical portions of the escutcheons. With this point gained, and the judgment properly exercised to tell to which order of the class you have decided the cow belongs, and a proper sense of handling the skin and hair, you see the system is very simple, and soon acquired.

The Escutcheon.—We have now the outline of Guenon's system; let us examine more in detail into the variety of escutcheons. The drawings given (pp: 478–483) represent the *first order* of the ten *classes*, with the quantity given by each class and the length of time they will milk. The *quality*, of course, is indicated by each animal.

The escutcheon is that surface of the udder, the perinæum, and the thighs, where the hair grows upward. On all the remainder of the animal the hair grows downward. Escutcheons extend, according to their class, from the centre of the four teats to the level of the upper extremity of the vulva, and may extend in breadth from the middle of the hinder surface of one leg to the middle of the hinder surface of the other. By their form or configuration, escutcheons characterise and distinguish the ten families which together constitute Guenon's classification.

Each of the *classes*, or families, is of fixed form, always similar to itself, but variable in the dimensions of its surface, and is estimated by the limits of the escutcheon. The extreme limits are the hams, the udder, and vulva. It is the variation

of the extent of this surface, which divides each class, or family, into six *orders*. The escutcheon of the first order is the most developed, and is also the best marked; that of each of the lower orders is similar in form to the first order, but is in reduced proportion, or with the dimensions reduced, or brought into less extended limits, reaching no longer the hams, nor covering the interior of the thigh, nor yet reaching up to the vulva. In any case, the broader it extends upon the thighs, the lower down and higher up the broad part covers, and the higher up and the broader the vertical portions are; and the more perfect and equal, or uniform in shape of its class it is, the better is the escutcheon.

The lower half, or broad portion, of the escutcheon, is of nearly similar shape in all the classes; only in the lower classes it is not quite so broad, nor quite so high up, as on the better classes; while the vertical portions gradually diminish both in height and breadth, until, in the tenth class, there is none at all. We, therefore, in speaking of the escutcheon, divide it into two parts. The lower portion, or broad part, running on to the thighs, we call the thigh-escutcheon; the upper portion, which extends up to the vulva, or towards it, we call the vertical portion. The thigh-escutcheon in all the classes resembles a round-pointed shovel; while the vertical portion may be likened to the handle. Now, remembering this fact, that the vertical or upper portions are what mostly distinguish the different escutcheons, will show that most attention is to be paid to the vertical part; also, it is about the upper part the blemishes usually appear which detract from the value of the escutcheon.

The lower part, or thigh-escutcheon, indicates the quantity of milk the cow will give; the upper portion, or vertical escutcheon, the time she will milk; and the colour of the skin, the feel of it, and the character of the hair on the escutcheon, will tell the quality of the milk. And these three points must be judged partly, also, by two other matters,—the size and the breed of the cow. The nearer any cow comes, in hair and mellowness of hide, to the characteristics of a first-class Jersey cow, the nearer she comes to first quality for richness of milk and for butter.

The effect produced by the change in the direction of the growing of the hair, which forms the escutcheon, is not glaring on the animal. It is merely a difference of lustre and the gloss on the surface of the escutcheon, from the part of the skin surrounding it. The hair of the escutcheon is finer, shorter, more furry, and more silky. Its appearance at first glance makes one think this part of the animal has been shaved, and is perhaps quicker seen than the hair on the rest of the animal. It is more easily seen in summer, when the hair is shorter, and usually the animal is cleaner, and the hair more glossy from the

nature of its feed ; also, it is to be seen better when the animal is near her period of calving, or just after it, as the udder, the veins, &c., are more distended. The drawings of Guenon represent the escutcheon as it would be seen if the skin of the udder and the escutcheon were stretched upon a board ; and it oftentimes can be seen much better and more truly if the thighs are stretched apart, and the skin distended by the hands. If in winter there is any difficulty in seeing the outlines of the escutcheon clearly, by drawing the back of the hand down it with the nails downward, they will rub against the up-growing hair, and it will thus be easily defined. Also, if the cow advances a few steps slowly, it will show the different parts more surely.

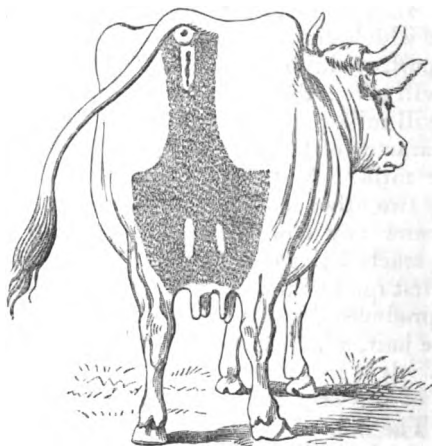
The escutcheon also indicates, in all animals whose escutcheons are of the first order, that are in good health, and to which no accidents have happened, as plainly its generative ability as its production of milk. It is therefore highly important that the bull should have a good escutcheon as well as good shape, fine hair, and mellow skin.

NAMES OF THE ESCUTCHEONS.

The names which Guenon gave to his ten classes of escutcheons were arbitrary, and have but little significance.

Fig. 1.—*Flanders :—First Class, First Order.*

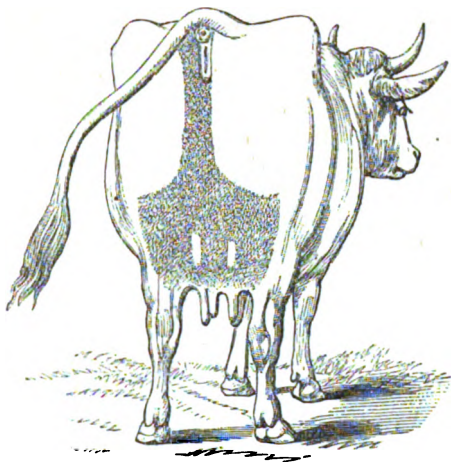
Twenty quarts, Nine months.



The first class he called Flandrine, or Flanders, because it is the best ; and he named it after the best cows he knew,—those from Flanders or the Flemish breed, and they had more cows with this escutcheon than those of any other breed.

Fig. 2.—Left Flanders :—Second Class, First Order.

Eighteen quarts, Eight months.



The second class he called *Flandrine à Gauche*, or *Left Flanders*; because it has a Flanders escutcheon, but it extends up entirely to the left of the vulva.

Fig. 3.—Selvage :—Third Class, First Order.

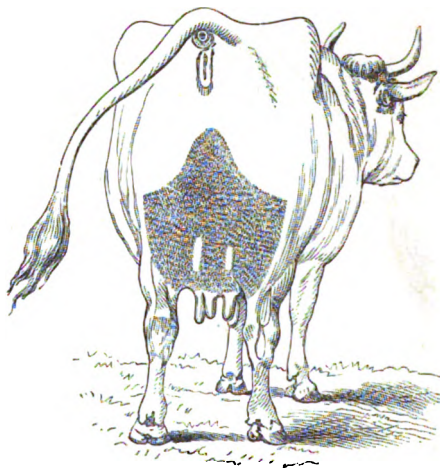
Nineteen quarts, Eight months.



The third class he named *Lisière*, or the *Selvage*, from a fancied resemblance to a selvage, or binding of a piece of cloth.

Fig. 4.—Curveline :—Fourth Class, First Order.

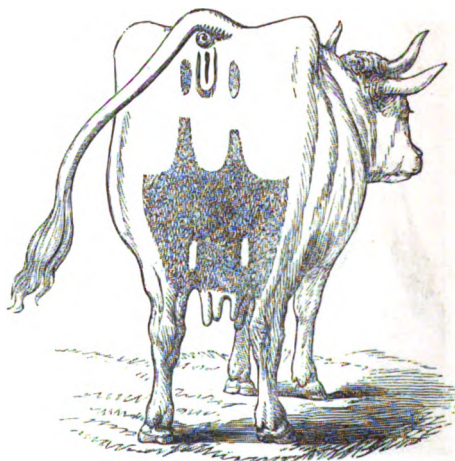
Nineteen quarts, Eight months.



The fourth class is the *Courbe-Ligne*, or *Curveline*, because their escutcheon is lozenge-shaped, formed by a curved line, which sides to the right and left.

Fig. 5.—Bicorn :—Fifth Class, First Order.

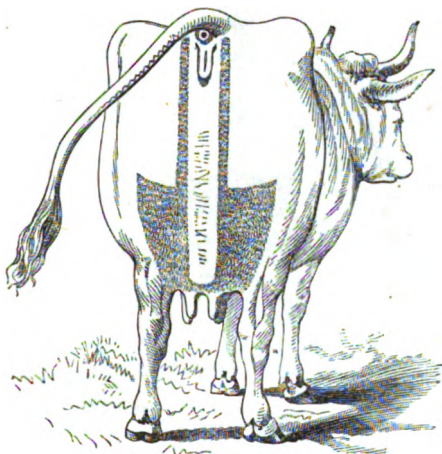
Seventeen quarts, Eight months.



The fifth class is *Bicorn*, because the upper part of the escutcheon forks in two horns.

Fig. 6.—Double Selvage :—Sixth Class, First Order.

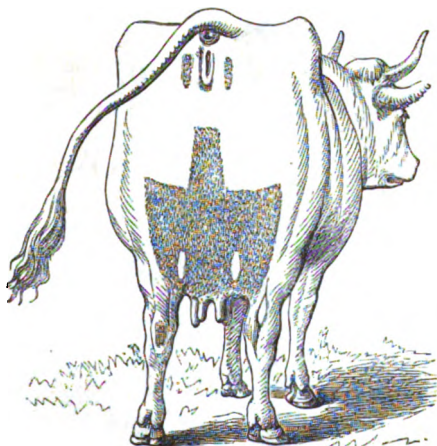
Eighteen quarts, Eight months.



The sixth class, Double-Lisière, or Double Selvage, is an odd freak of nature.

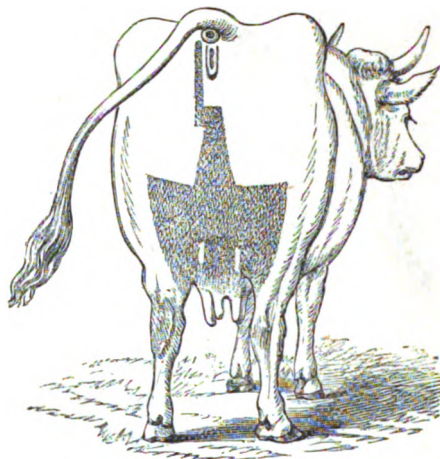
Fig. 7.—Demijohn :—Seventh Class, First Order.

Seventeen quarts, Eight months.



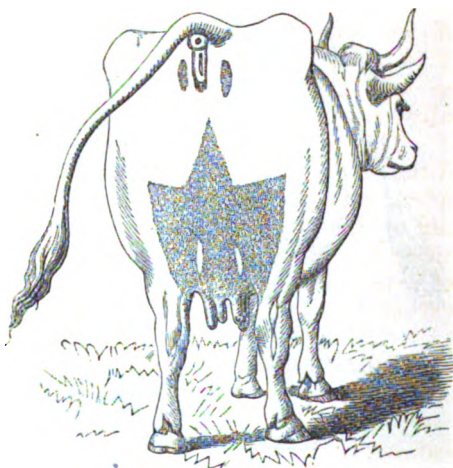
The seventh class is Poitevine, or Demijohn, from a fancied resemblance to some kinds of demijohns.

Fig. 8.—Square Escutcheon:—Eighth Class, First Order.
Seventeen quarts, Eight months.



The eighth class he called Equerrine, or Square Escutcheon, as it is square at the upper part.

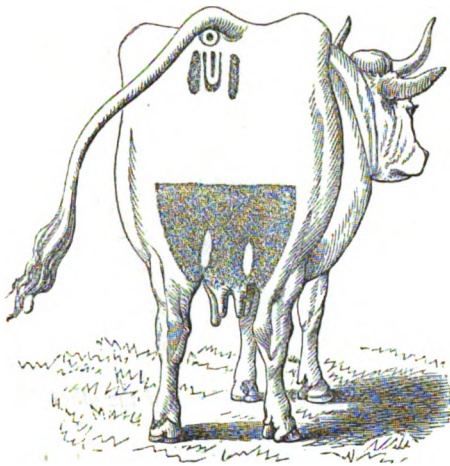
Fig. 9.—Limousin:—Ninth Class, First Order.
Fifteen quarts, Eight months.



The ninth class is the Limousin, as it was on a cow from that province that Guenon first saw this shaped escutcheon.

Fig. 10.—*Horizontal:—Tenth Class, First Order.*

Thirteen quarts, Eight months.



The tenth class he named Carrésine, or Horizontal, because the upper part of the escutcheon is cut squarely by a horizontal line.

THE BASTARDS.

Each of these ten classes have the bastard escutcheon; that is, there are some cows which, though well marked, begin to fail in their milk as soon as they are with calf again. Some will fail very rapidly, others more slowly. They generally are marked first-class, and are the handsomest cows. They are to be looked for carefully, as they often mislead the best judges. They are distinguished in the first, or Flanders, class by an oval in the vertical escutcheon, or by the hair on the edges of the vertical, where it meets the down-running hair, having a coarse, bristly, wiry character, and rather of a lustrous appearance, standing out from the body. The oval on the vertical has hair also of a shiny, lustrous appearance.

All the other classes have alongside the vulva two oval patches of coarse hair, one on each side. The larger the ovals, and the coarser the hair on them, the sooner they will fail. Generally speaking, if the animal is closely examined, the hair will be found harsh, dry, and long, particularly on the back of the udder; the skin is apt to be white and thick; little or no dandruff, and of a dry, scaly nature.

Fig. 11.—*Bastard Escutcheon of the Flanders Class.*

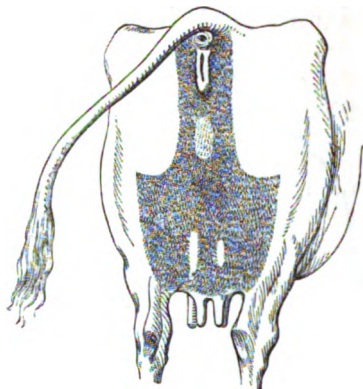
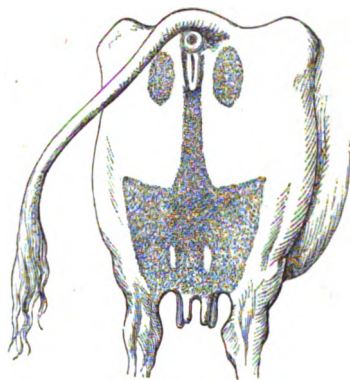


Fig. 12.—*Bastard Escutcheon of the other Classes.*



The Ovals.—There is nearly always a sign accompanying a good escutcheon, and that is, one or two ovals on the bag, just above the hind-teats, on which a *fine* coat of hair grows downwards. They are shown on all the first orders drawings. These may be large or small, may be one or two, and may be alike or unlike in size; but they are always good signs. Two are better than one, and the more uniform they are the better; and the finer and softer the hair on them, the better the indications. No escutcheon is first-class if it has not both or one, and of good size. They are generally easily perceived by a whiter and more shiny appearance of the hair on them. If they are very large and irregular in shape, and have very coarse hair on them, their value would rapidly diminish, and in such

cases it will generally be found that there are other deteriorating signs.

There is still another very unfailing good mark, though it is not mentioned by Guenon, and the Pennsylvania Guenon Commission first brought it to notice, as their experience had long proved it to be a good sign. They call them *Thigh-ovals*. It is where the vertical loses itself in the thigh-escutcheon. Here the down-running hair makes a semi-circular dip into the broad escutcheon. If this is of fine short hair, it is an excellent sign, and the Commission put great faith in it.

IMPERFECTIONS.

Besides these favourable marks, there are those that are imperfections, denoting a decreased yield, a poorer quality, or a shorter time for giving milk. As these must be learned with the book in hand, in presence of the animal, we shall not describe them here fully. The first and most important imperfection is that of the escutcheon itself. Where the escutcheon is irregular in shape in either class, not uniform on both thighs, then a certain discount must be allowed in proportion as it varies from the perfect one of its class. The most prominent imperfections are those about the vulva (which Guenon called *epis*, or *tufts*), and cuts or slices out of the outlines or sides of the thigh-escutcheons. He says the cause of these latter defects is, that the veins situated beneath, on either side of the belly, have a peculiarity,—that they are contracted, and there is a small opening for them where they pierce the abdominal muscles. All imperfections encroaching on the escutcheon diminish its value, and indicate a decreased aptitude for yielding milk. These tufts are classified into two kinds—those on which the hair ascends, and those on which it descends. Coarse hair on the udder may certainly be considered a blemish or imperfection.

Sometimes there is an intermingling of two forms of escutcheons. This arises from the crossing of two animals having different classes of escutcheons, and sometimes renders it difficult to tell in which class to place the animal. In such cases, judge it by the class of escutcheon it the most nearly resembles.

Guenon, in his earlier editions, said nothing about bulls. In the revised and last edition, from which my book is translated, he has a special chapter, and thirty illustrations. This is a very important addition, as the choice of a good bull is the foundation of a good herd. Too little attention has been and is paid to the quality of the bull. He stamps his qualities upon his get. I have gone through herds, and picked out every

animal gotten by one and the same sire. Guenon says the characteristic signs with the males, as with the females, have a significant value of the highest importance: they portray the reproductive qualities, those having the largest and most perfect escutcheons possessing the greatest ability for procreating good milk cows.

As also with the cows, the colour and quality of the skin, and the fineness of the hair, are thoroughly necessary to be first-rate.

There is one difference—certain classes are much oftener found than others, and in this order: 1. Curveline; 2. Limousin; and, 3. Horizontal. The others are rarer, according to the order in which he gives them; the Flanders being the most seldom found.

Cause of the Escutcheon.—The escutcheon was so called, we presume, from its similarity to the shape of a shield; and, on a first-class cow, the lower part of it will be very like it, or somewhat like a round-pointed shovel. On this escutcheon the hair will be generally of a different colour from that bordering it, most generally rather darker, always shorter, and more nearly resembling fur. It thus becomes the outward sign of the milking and generative qualities of any cow, of any breed, that all may see and understand.

Why this escutcheon is placed there, why it varies on different cows, and what causes it, have not yet been positively settled. My own impression is, that, tracing cause and effect, it is the outward sign of vigour and good constitution in the animal. If she is perfectly formed, in good health, she will generally be a good eater and good milker; these points develop the blood-vessels and the mammary glands largely. As the arterial vessels terminate in veins, the more vigorous the animal, the larger the veins, and the more widely they ramify; and, as they lay under the skin, they cause the hair to grow in a contrary direction.

Monsieur Magne, who early developed Guenon's system, accounted for the connection of the escutcheon with the flow of milk in that the hair turns in the direction in which the arteries ramify, and that the reversed hair on the udder and adjacent parts indicates the termination of the arteries which supply the udder with blood.

This is the most likely explanation of these marks, and it is confirmed by the experience of each member of the Pennsylvania Commission. We have invariably noticed, where there are large knotty milk-veins, so called, particularly when there are two on the belly, and the udder is covered with prominent zig-zag veins, and these extend up on the perinæum, that that cow is a first-rate cow, and, as such, she has a first-class escutcheon.

Professor Arnold, a high authority in this country on dairying matters, quotes Monsieur Magne, and adds :

"But none of these indications, taken singly, is an infallible evidence of large yield. They must be considered together. A large escutcheon and milk-veins, coupled with a small stomach, would be marked down at least one half of what they might otherwise signify ; and a large digestive apparatus, coupled with small milk-veins and escutcheon, should be marked down in the same way. Keeping the leading indications in view, observation will soon enable one to make close estimates."

Doctor D. E. Salmon, one of the ablest veterinarians in this country, has discussed this question in a very clear manner. I have printed this article in my handbook, from which I quote the following, though such fragments of his argument do not do him or it justice :

"Magne's facts are correct, whether his inferences are or not. *The same artery that supplies the udder with blood supplies the skin on which the escutcheon is formed ; and, more than this, the artery ramifies in the direction in which the hair of the escutcheon grows.*

The Dutch-Friesian Cattle-Breeder's Association have adopted rules that no cattle can be entered in their registry unless they have the higher classes and orders of escutcheons as laid down by the Pennsylvania Commission.

General View of the Subject.—This science of Guenon is no new thing, nor a thing of a day. It was adopted, after ample testing, by the leading agricultural societies, and by the government of France. The ablest scientific men have tested and approved of it in all countries ; yet until within a few years it has never been popularised in this country. The translation of Guenon's book by N. P. Trist gave only a portion of it ; and at that time his system was crude and incomplete, and it has never been altered, or brought up to Guenon's revised rules and alterations, to this day. It still maintains the numerous divisions and subdivisions, amounting to two hundred, into which Guenon separated it with the exactness of an enthusiast, making it very forbidding, and dismaying many, nearly every one, from taking hold of it. In his later issues Guenon simplified it very much, making more distinct classes, and reducing the number of orders, and giving a separate treatise on bulls. In order to simplify it much more, I have prepared a handbook,* and with so many illustrations, as to enable any intelligent man to become master of it in thirty days.

In 1878-79 a Commission acted under the orders of

* 'How to select Cows on the Guenon System.'

Governor Hartranft of Pennsylvania, to test the system, and whether its reliability would recommend it for popular use. Their report of the examination of two hundred cows of various breeds shows a successful statement of their qualities to about ninety per cent. The mode of proceeding was to examine the cow, and make notes of her points as to quantity, quality, and time of milking. This was independent of the owner, and the record was kept by the secretary. A similar statement from the owner, who knew, of course, exactly what his cows would do, and generally made beforehand, was afterward handed to the secretary of the commission, who transcribed the two statements ready for publication in parallel columns; these statements were then placed with the originals before the owners, who compared them, and certified to their correctness as originally taken down, and they were ready for publication. This plan prevented any collusion, or any chance of altering to assimilate the two statements. The examinations were made only by the escutcheons, and no statements were allowed to be made by any one to the Commission, until after their judgment and record had been made. Some of the cows were blanketed, so that nothing more was shown than is to be seen in the drawings illustrating this article; this was done in the presence of a committee appointed for the purpose of seeing whether the commission did examine only by the escutcheon; though that was asking more of even experts than Guenon claims to be able to do, or should be done.

XVIII.—*Observations on the foregoing Paper.* By G. W. BAKER,
of Luton Hoo Park Farm.

[A Letter to the Editor.]

DEAR SIR,

I HAVE felt very great pleasure in reading through the treatise on Guenon's System of selecting Cows by the Escutcheon that you have been good enough to forward to me, with a request that I would express an opinion on the subject. I therefore beg to say that I consider it of the utmost importance, particularly at the present time, when agriculture is straining every nerve to keep its head above water, and the produce of the dairy is becoming of so much importance not only to the farmer, but to the community at large; I have therefore jotted down some of the points that are most essential in an animal that is intended to take a useful position for dairy purposes; and I think it may be safely said that any cow used for such a

purpose without the necessary milking characteristics should be fatted off as soon as possible, as such an one should seldom, if ever, be kept for breeding purposes. I think, too, that young dairy animals should not be let to run on beyond two and a half years old, without producing a calf, as I am of opinion that if they are left longer, their milking propensities suffer. The animal will become grosser, and a tendency to form flesh will be set up in the system in proportion to the length of time that the demand for producing milk is neglected. I think all young dairy animals should be kept in good store condition *only*, as it is doubtless an easy matter to spoil a young cow for dairy purposes by too liberal treatment, however well her markings are developed in early life. In evidence of this we have the experience of many Shorthorn men, who bred for thick backs and very large muscular thighs, at the expense of the milk.

The perfection of milking characteristics, to my taste, is an animal with a fine escutcheon, with rather thin thighs, giving plenty of room for the bag to extend itself when necessary; the udder, of course, should be deep and broad, extending well forward, with four well-placed teats of medium size, and with the skin of the udder as elastic as a kid glove. Then with a cow of good constitution, a well-formed body, on four good legs set outside of her, with a rather fine long head set on a thin neck, with silky hair (if it is a little long so much the better in this changeable climate), covering a rich elastic skin, I think you may expect pretty good results in the dairy. The horns should be fine and well placed in the head, curving rather inwards than otherwise, and the back should be straight, with a rather long tail starting from the body at right angles with the back, if you want a handsome animal; and of course it is desirable to attain as many points as possible. Beauty must be admitted in judging for competitions, although it is not an essential characteristic for the dairy; and consequently a *pretty* animal may sometimes properly be dispensed with when brought into contact with a neighbour who surpasses her in usefulness, although lacking some of her good looks. The cow should be able to move well, and possess an appetite that will enable her to support her constitution when she is making a liberal return to her owner, who is treating her well.

Yours very truly

G. W. BAKER.

March 3rd, 1885.

H. M. JENKINS, Esq.,
12, Hanover Square,
London, W.

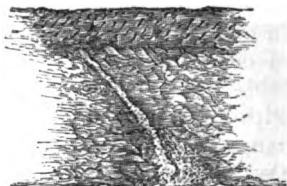
XIX.—Observations on the Development of Ox Warble, and Warble Maggot. By ELEANOR A. ORMEROD, F.R.Met.Soc., Consulting Entomologist to the Royal Agricultural Society.

THE following observations on the Ox Warble-maggot are an endeavour to describe the changes, both in external form and internal structure, which it passes through so rapidly (from the time it is first noticeable in the opening warble until it gains the shape in which it is best known), that little notice appears as yet to have been taken of the details. The constant supply of fresh specimens of hide and of living maggots with which I was favoured during the last spring, enabled me to watch their habits and their method of growth almost from day to day, and in many respects these bear so practically on the direct method of injury to the infested cattle, and on the manner in which the opening in the warble is formed and enlarged, that the shortest possible description of them may be of some interest.

Fig. 1.—Ox Warble Fly,
Hypoderma bovis (Degeer).



Fig. 2.—Channel through hide,
much magnified.



The commencement of the attack had been noticed in the previous November in the form of small inflamed patches or swellings on the flesh-side of the hide, within which the maggot lay free—that is, not enclosed in a cell—and down to which swellings a fine channel passed from the upper surface of the hide.

This channel appeared to have no lining membrane, but to be merely a passage gnawed or torn by the mouth-hooks of the maggot, and (as in Fig. 2) sometimes slanting, or taking a straight course, or so *completely curved* at the upper part of its course, that it was impossible that the channel where this curve existed could have been formed by the ovipositor of the fly; consequently, as the method of egg-laying may be presumed not to vary (to all appearance), proving that the egg from which the maggot hatched was laid either outside or just beneath the outer cuticle of the hide.

Careful watch was kept both on living cattle and newly-flayed hides in various localities throughout the winter, in order to

secure the date of the first appearance of the warble in its open condition, which took place (generally) from about the 14th to the 25th of February. The first advance on the condition of a mere hair-like streak through the hide was found in specimens cut from the hide of a young bull, and sent me by Mr. John Dalton, of Wigton, on Jan. 27. In these there was the first appearance of the warble as a *perforated swelling*, with the maggot of a clearly distinguishable size within. The channel through the hide was still very small, the opening on the outside being about as large as the prick of a common darning-needle, and below, though larger, scarcely the sixteenth of an inch across.

This perforation, or maggot gallery, was somewhat cone-shaped, with *smooth, white, shiny walls*. These conditions are important to be observed, as they show that the passage could not be formed by ulceration, which would not have given clean smooth walls to the hole.

The maggots in this state of warble differed in size; the smallest I measured was about half an inch long, and nearly worm-like in shape; rounded at the mouth-end, bluntly pointed at the tail, white, transparent, and marked across what may be

Fig. 3.—Young Maggots, much magnified.

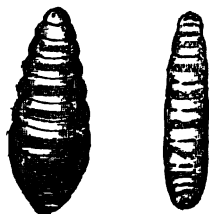


Fig. 4.—Mouth forks of very young Maggot, much magnified.



called its back, with sixteen short bands of very minute black or dark grey prickles, placed, for the most part, in alternate very narrow and broader stripes. There was some variety in the shape of the maggots, according to whether they were alive and distended with fluid, or other circumstances; but those I had at this stage were worm-like or spindle-shaped, and in the youngest condition the maggot was furnished with a pair of strong mouth-forks (Fig. 4), which are a most important item in its structure, and, as far as I am aware, have not previously been noticed in the young maggot of this species of *Hypoderma* or Warble Fly.

The apparatus may be described as consisting of a pair of crescent-shaped forks, placed nearly side by side, at the ex-

tremity of processes somewhat bent apart at the ends by which they are attached to the crescents, and attached by the other ends to the membranes or tissues forming the gullet, or internal sac of the maggot; see Fig. 4, showing, at 1 and 3, the crescent-shaped forks in slightly different positions, and at 2, the apparatus viewed sideways, so as to show the curved ends of the processes. The material is chitinous or horny, and the colour yellowish-brown, and, though excessively minute, the hook forms a very serviceable cutting or dragging implement.

The possession of this apparatus by the maggot in this early stage is a great confirmation of the belief that the creature gets down to the sub-cutaneous tissues of the hide simply by cutting its way forward. We appear here to have both cause and effect, for we find as a regular thing that there is a minute track down to the embryo warble beneath the hide, which said track has the appearance of having been cut or gnawed; and in the exceedingly young and still worm-shaped maggot found on Jan. 27, there was the apparatus for cutting, or gnawing.

The duration of special habits of life in the maggot may be divided into three periods: that above mentioned, when its chief work appears to be making its way down; the next, when it starts into the active state which *precedes* its first obvious appearance in the opening warble, and in which its most important work is forcing its way up again, tail foremost; and the third, in which, having formed the opening, it lies within, feeding, mouth-end downwards, in the filthy discharge its own presence causes, until it is ready to leave the hide, and turn to the chrysalis state.

The method by which the perforation is effected has given rise to much ingenious speculation; but, by carefully watching the habits of the young living maggots, and likewise the condition of the perforation in fresh hide during the very short time which is occupied by the first formation of the perforated swelling known as the warble, the whole process appears clearly traceable.

The tip of the tail of the maggot, which is of necessity the point of the wedge that precedes its owner up the hide, is *not* now ended, as in its latest state, by two flat, kidney-shaped spiracles (Fig. 5); whilst the boring work has to be done, the spiracles are of a different form. They are, during this time, somewhat club-shaped, or, when highly magnified, appear like short bent cylinders (Fig. 8, p. 495). These are of horny or chitinous materials, and each of the pair of spiracles, or breathing-pores, is placed at the extremity of a large trachea or breathing-tube, which pair of tracheæ are tied together by a transverse tube placed near the spiracles. The maggot is thus

provided (Fig. 6) with a compact, hard-tipped apparatus, very suitable, with due pressure from behind, to force open and gradually enlarge the fine passage (see Fig. 2) leading down in the early stage of attack, from the outside of the hide to the embryo swelling beneath.

Fig. 5.—*Latest form of Spiracles, much magnified.*

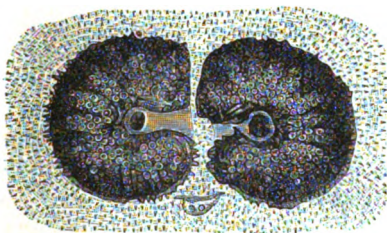
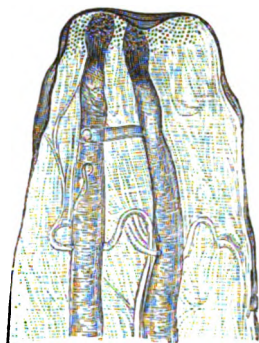


Fig. 6. — *Spiracles and Tracheæ of Young Maggot, much magnified.*



The power of pressure possessed by the maggots at this period of their life is enormous, from their capacity of inflating themselves with fluid until they are so hard that it is scarcely possible to compress them with the fingers, and likewise from their having (apparently) no power of discharging any of their contents. Thus they form living and growing plugs, quite capable of pressing back the tissues from around them, or from before the small hard tip; but *not* subject (so long as they continue inflated) to being themselves compressed. I had opportunities of watching this process of inflation both in the worm-shaped maggots and when they were slightly more advanced in growth to a club or lengthened pear-shape. On placing them in fluid suitable for absorption (as in glycerine and water, in which they would live for as long as eighty hours, or until the spiracles sank completely beneath the surface) they became hard and shiny, and with little trace of the segments which are so clearly marked when the maggots are fully developed; in fact, they were almost of a glassy smoothness, save for the short bands of minute prickles placed along a portion of the back.

The size and shape of the perforation through the hide altered progressively with the growth of the maggot. At first this passage was very little larger at the lower than at the upper opening; and though the walls of the perforation had now become smooth and shiny, I could not distinguish the

presence of any distinct lining membrane. With the enlargement of the passage its shape became more cone-like (corresponding with the altering form of its tenant); and on March 5, I found for the first time a distinct pellicle or skin-like membrane covering the walls of the perforation, or passage, and continuous with the lining of the maggot-cell below. The amount of development of the warbles at a given date varied very much; warbles just beginning to form might be found together with those nearly three-quarters of an inch across, as measured on the flesh side of fresh hide on the 4th of March, but, when once started in growth, the progress was excessively rapid, and those who wish to watch the progress of the first stages have need to be on the alert.

The great change, both in the appearance and the internal structure of the maggot, took place when it was grown to about a third of its full size, when it assumed its well-known shape. Previously to this, whilst the work of forming its passage was still in progress, its chief characteristics externally were the absence of everything that could obstruct its power of pressing onwards; and internally it was little more than a bag of fluid, with a large proportion of the space occupied by *breathing-tubes*,—a very important consideration relatively to available methods of destroying the creature. At the period, however, of its moult to its final stage, a change takes place respectively in the nature, or in the amount, of development of nearly the whole of both the internal and external structure of the maggot. The hard tips necessary, or at least serviceable, for forcing a passage up the hide, are no longer needed, and they are exchanged for a broad form of spiracle (Fig. 5), and the internal organs become suited to provide material for the development of the fly, which will presently form in the dry husk of the maggot which serves as the chrysalis case.

One of the first and most remarkable of these changes is the complete alteration in the form of the spiracles. Up to this stage the general form continued (see Fig. 6) to be that of a pair of short horny, somewhat bent cylindrical, or partially cylindrical tubes, covered at the end (Fig. 8) with round or oval discs, which appear to have a definite narrow border, and across the centre of the disc to be of a sieve-like or spotted appearance. Fig. 9 precisely represents the appearance when much magnified. These discs may amount to as many as about six-and-twenty on each spiracle, and appear to me to be placed each at the extremity of short cylinders. The structure is most elaborate and peculiar, and the only somewhat similar instance of this development in any maggot that I am aware of having been observed, is in the structure of the cephalic spiracles of the larva of the *Trypeta*

pomonella, Walsh, described by Professor H. Comstock in the Report of the Department of Agriculture U.S.A. for 1882, p. 197. There it is noted that each of the spiracles he describes "is expanded into a plate, the free margin of which is fringed by a double series of cylindrical projections about twenty in number. With a very high power of the microscope the distal end of each of these projections appears to be sieve-like, an arrangement which doubtless prevents the entrance of any foreign matter into the respiratory system." Whether in the case of the warble maggot the spotted or sieve-like appearance is given by microscopic hairs placed to preserve the entrance free, or by other structures, I could not ascertain on account of the excessive minuteness of the organs; but a fringe of this nature is to be found in some forms of spiracle, and the use of such an apparatus to guard the entrance of breathing-tubes, when acting in a passage which is being formed in living hide, is obvious.

Fig. 7.—Full grown Maggot, under side, much magnified.

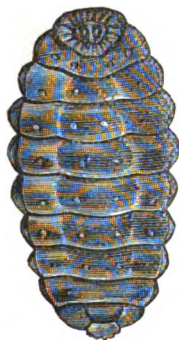


Fig. 8.—Spiracle Tube (one of the pair), much magnified.



Fig. 9.—Discs at extremity of Spiracle, as seen with $\frac{1}{4}$ -in. object glass.



Up to the time when the moult takes place to the final form of which I am now speaking, these spiracles are buried up to their disc-covered tips in the tail end of the maggot; but then they are cast off entirely with the moulted skin, and in the newly exposed skin beneath we find the first appearance of spiracles of the well-known kidney shape, but with the surface more radiated, and of a paler chestnut colour than in their later condition.

During the spring investigations I had an opportunity more than once of observing and also securing both the moulted skin containing the early form of spiracle, and likewise the proprietor maggot, bearing the new kidney-shaped pair; and also, in one instance, secured the maggot when about to moult off the old

skin, and thus was enabled to secure the specimen whilst still bearing the rejected early form of spiracles in the old skin, with their lower ends still attached to the new kidney-shaped pair now formed at the tail of the maggot.

Figs. 10 and 11 show the old club-shaped form, resting on the

Fig. 10.—*Early form of Spiracle, with fragment of Moulded Skin, still attached to Kidney-form shape, much magnified.*

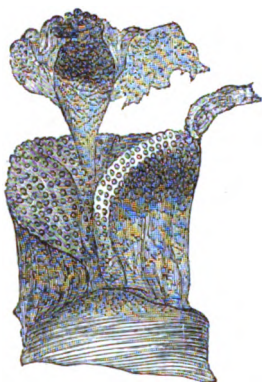
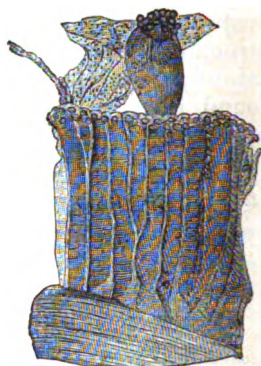


Fig. 11.—*Fig. 10 in different position, showing Breathing Pores.*



kidney-shaped form, which, after this change, lasts, with some slight modification, through the rest of the life of the maggot.

The newly formed spiracle, having had a portion of its thickness removed so as to show it as a transparent object, will be observed to be furnished at the upper surface with numerous cylindrical pores or openings, corresponding in appearance with those represented magnified at Fig. 9. These are the terminations of cylindrical passages which are connected lower down, and which appear, as far as the thickness of the chitinous material allows them to be traced, to be ramifications of a small number of upright passages opening from the great trachea below, and passing upward through the spiracle, thus giving communication with the outer air by means of the cylindrical branchlets with their open extremities.

The internal apparatus of the spiracles and the attached breathing-tubes underwent a corresponding change at the time of this moult. Fig. 12 gives an inside view of the base of the newly formed spiracles with apertures in the centre, leading into the old pair above them.

The parallel lines round a portion of the circumference of the fluted saucer-like discs, and the raised portion round the central

perforation, show where a small portion of the old and new air-tubes (tracheæ), belonging to the old and new spiracles, were cut through in making the transverse section.

These air-tubes, like the spiracles at their extremities, were now, at this portion of the maggot, in duplicate. This in itself is not remarkable, but it is not often that the moult of the tracheæ can be so perfectly observed. A reference to Fig. 6 will show the general appearance of the tracheæ of the maggot,

Fig. 12.—Bases of pair of old and new Spiracles (viewed vertically), much magnified.

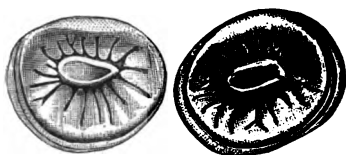
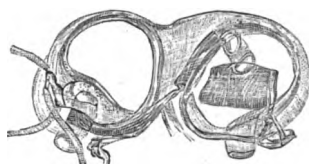


Fig. 13.—Section of Tracheæ, much magnified.



with the *cross trachea* that joins the two main tubes; and on making a section across at this point, the old air-tube with its branch was clearly to be seen, lying detached in the corresponding part of the new tube.

The cross section shown at Fig. 13 shows the newly formed tracheæ with the connecting tunnel, and within one of the tubes is a section of the smaller old trachea, now floated loose in the balsam in which it is preserved, but which, when freshly cut, had its main side-branch down the side-branch of the larger tube.

These special observations on the moult of the breathing-apparatus may very possibly not bear practically on the subject of the prevention of warble injury; but they are of interest to show how minutely we are acquainted with the history of this maggot, the ravages of which are, in many cases to this day, left unchecked, as being a pest of unknown nature, and of which, therefore, the cure is unknown; and, further, the specimens give an unusually detailed example of the completeness of this internal moult. The sections having been taken so as to remove respectively some small fragments, both of the brown and the white structure at the junction of the spiracles with the tracheæ, they may be accurately fitted together again, and thus form a whole, showing the old spiracle still bearing the old skin round its top raised on the new form, likewise surrounded by the new skin; and, beneath, we have the corresponding old and new air-tubes.

Other alterations of a very practical kind also take place at this time, or follow on this most important of the moults. The

skin of the maggot becomes furnished within with a powerful coat of muscles, extending over it like basket-work. A maggot at this stage, besides the power of contraction and expansion, which may be observed in protruding and withdrawing the mouth-end with the regularity of pulsation, has a power of dragging itself along at a rate of three times its own length in two minutes, and has a very definite method of progression. The mouth-end is somewhat raised, and the creature appears to move with as settled a purpose in any given direction as other grubs or caterpillars. Externally, in this stage the skin of the

Fig. 14.—*Muscles within Skin of Maggot, magnified.*

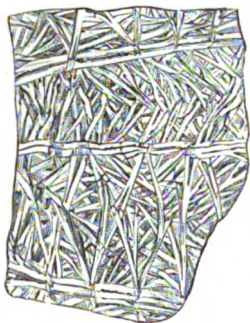


Fig. 15.—*Prickles of Maggots, much magnified.*

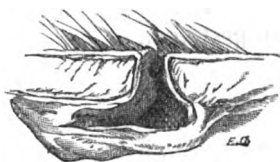


maggot is furnished with a much larger amount of prickles, arranged in more numerous bands, than are noticeable in the previous stages. The prickles are now strong enough to cause an unpleasant sensation when the maggot crosses the hand, and to play an important part in its locomotive powers in its cell, and in the effect on the tissues caused thereby. The visceral contents are now thick, and obviously formed of the filthy matter, which is caused by the perpetual irritation of the suction of the mouth-end of the maggot at the bottom of the sac. It is also now furnished with a small curved caudal aperture, placed nearly between the spiracles (see Fig. 5), from which some slight amount of discharge of contents can take place.

These are the main differences connected with the moult to the final form of the maggot, and, following on these alterations in its structure, and especially on the power of keeping up a constant irritation by means of the muscular expansion and contraction of its prickly skin, we find the lining membrane of the cell increasing in thickness, until it becomes well defined as a tough wall round the perforation, continuous with the upper part of the cell. Fig. 16 shows a cell drawn in section, and

slightly magnified after maceration in water. The lowest end of the maggot chamber appears full of foul matter, caused by the irritation of the friction and suction of the maggot; and after the creature has crawled from its hole, a pressure on the empty warble is followed by a discharge of some amount of purulent matter.

Fig. 16.—*Warble Cell slightly larger than life.*



When the maggot has gained the condition mentioned above, it undergoes no further great change until it turns to the chrysalis state. The spiracles become less radiated and darker, the maggot also becomes darker as it increases in size; but the main points of its life now are to form, at the expense of the animal in which it lives, the material from which the fly will presently be developed, to start (unless means have been taken to prevent it) the next season's attack on the herd.

XX.—*Abortion in Cows.* By CLEMENT STEPHENSON, of Newcastle-upon-Tyne.

RECENT extensive outbreaks of this costly malady have brought the subject prominently to the front. It has never received the attention and thorough investigation which, from its great importance, it is entitled to; but the knowledge of it has been left very much in the hands of breeders and herdsmen, who have long known and dreaded its ravages. Sad experience has taught them many valuable but expensive lessons, and each observer has got hold of some practical facts; but opinions respecting its causation, treatment, and the best means to be adopted to arrest its progress, are so varied and difficult to procure, that little or no reliable information has been obtained.

Before entering upon the consideration of the subject, it is necessary to remember the unnatural artificial condition in which many domesticated cattle are kept. Little attention is paid to the quality and properties of food and water, and the sanitary arrangements of byres, especially air-space, drainage and cleanliness, are often neglected. We must keep in view the sensitive condition of pregnant animals, and the intimate connection that exists between the health of the mother and that of the fœtus. We must also try to realise the acute degree to which the organ of smell is developed in animals, smells of which we may have no cognisance, or that may be repulsive to us, have attractions and charms for them.

Abortion is met with in two forms—namely, “Sporadic,” isolated occasional cases, and “Enzootic,” general outbreaks affecting a whole herd. It may take place at any period of gestation up to the time when the calf is capable of maintaining an independent existence; but the second and the seventh months are generally looked upon as the most critical periods of gestation.

SPORADIC ABORTION.

Sporadic or isolated cases do not, as a rule, cause the breeder much anxiety; they are looked upon as part of the risks attending and to be expected in a breeding-herd; but inasmuch as they may and do under some circumstances establish centres of the disease, or are the forerunners of a general outbreak, they always require prompt and special attention.

Causes.—Amongst the most common must be placed direct violence, which, by producing shock and disturbance to the uterus or the nervous system, arrests development of the foetus, and leads to abortion—as seen in those cases following railway-journeys, slips and falls, jamming in door-ways, cows bullying upon each other, and excitement caused by dogs and strangers. Abortion may be due to a diseased condition of the mother: thus it often follows outbreaks of foot-and-mouth disease, and diseases of the stomach and bowels. Tuberculosis is a frequent cause of abortion. Cows with a tubercular taint may go on breeding for some time, so long, in fact, as the uterus, its appendages, and covering, are not implicated; but if any of these structures become involved, which they are ever ready to do, the cow, depending upon the state she is in, either ceases to breed, or, if in calf, aborts and breeds no more. Foetal life and development depend upon a natural healthy supply of blood from the mother, therefore anything which interferes with, or alters the character of, this vital fluid, must be classed amongst the causes of abortion. The relative constituents of the blood are affected, and morbid changes are produced by food, water, and general management. High feeding and want of exercise, or the reverse, food deficient in feeding properties, and exposure to bad weather, will all lead to abortion. The blood may also be rendered poisonous to foetal life by unsound food, food undergoing putrefactive changes, and by impure air and water: the latter from its quick absorption acting most directly. Abortion from these causes often takes place without any apparent disturbance in the health of the cow, but she may be primarily affected, and abortion ensue as a consequence.

Symptoms.—When abortion takes place in the early stages of gestation, the symptoms are slight, and easily overlooked: a

small piece of sticky, unnatural, pus-like discharge, or it may be a little blood adhering to the vulva, is all that is seen; but to the experienced eye it is enough to cause immediate attention and extra care. This symptom is readily detected in winter, when cows are mostly in the house; but when at grass, it often happens that the first notice we have that an abortion has taken place, is that the cow is in use, and this time more keenly than usual. In these cases the ovum or foetus is so small, that it is seldom found, and oestrus follows abortion quickly; the time is measured by days, not weeks. Hence the great importance of detecting the early premonitory symptoms, so that isolation may be effected. In the more advanced stages of gestation the symptoms are well marked and easily recognised. There is more or less general disturbance in health; the cow is restless, often lying down; the udder becomes warmer and enlarged; the pelvic ligaments and vulva are relaxed; there is a discharge from the vagina, and straining calving pains.

If these occasional cases are quickly observed and efficiently isolated,—the aborted foetus, membranes, and discharges promptly and carefully destroyed,—a thorough system of disinfection carried out,—and the cow only restored to cohabitation with her companions when she is in a perfectly clean and natural breeding condition,—the probabilities are that there will be no more trouble. On the other hand, if these precautions are neglected, more cases are likely to occur, and the diseased condition may even spread through the whole herd. Before leaving these cases, I wish to impress the importance of not again serving cows that have aborted until the uterus and vagina have regained their natural healthy condition; and even after the cow is coming regularly to her three weeks, it is better to be in no hurry to serve her.

ENZOOTIC ABORTION.

It is often most difficult to trace out the original cause of the extensive outbreaks of enzootic abortion. Neglected isolated cases account for some, and many are due to one common cause, in which group impure water has much to answer for. The importance of pure, and the injurious effects produced by impure, water has long occupied the attention of pathologists, and when we find that over 50 per cent. of the body weight, and 83 per cent. of the blood ('Power's Physiology'), consists of water, we can easily understand that pure water is essential to health and healthy functions. Water supplied for domestic purposes is carefully guarded against contamination; but any stream, pond, or pump, however polluted, is thought by some to be good enough for cows to drink. Fluids taken into the system are rapidly absorbed, and, according to their different

properties, purity or impurity, so is the blood affected. To realise the changes produced in the blood by food and other agents, it is only necessary to remember how quickly and with what facility many of them can be recognised in the secretions which are elaborated from it. A familiar example of this is seen in the use of turnips, which is detected in the butter of cows consuming them; and the use of many medicinal agents can be detected by the chemist in the milk and urine of animals to which they have been given. In 'Taylor on Poisons,' cases are quoted in which death and abortion of the foetus had been produced experimentally in animals by the administration of medicines and mineral poisons, given both in food and by subcutaneous absorption, the agents being afterwards detected in the foetus, its membrane, and fluids. The most common impurities found in water, as supplied to cows, are decaying vegetable matter, sewage, soakage from manure, and, in mining districts, iron and waste refuse materials in solution; of these, sewage is in my opinion the most active and prolific cause of abortion; nor need we wonder at this, for by analysis and microscopic examination it is found to contain not only injurious organic matter, but that it swarms with bacteria and other living organisms, with which we are sufficiently acquainted to know that they play an important part in producing morbid changes and disease. Water may be largely contaminated with sewage and other impurities without producing any visible injurious effects upon non-breeding adult animals; but in pregnant animals the delicate foetus is like a sensitive barometer, its development and life depending absolutely upon the purity of the maternal blood; it is influenced by variations and agents, against which independent life may be proof.

Bulls are often the unsuspected cause of abortion. Some bulls, apparently healthy, vigorous, and good servers—bulls, too, that have been good stock-getters—appear to lose their procreative powers. Cows that are served by them are seldom settled, and if so, often abort. There is a want of vitality, varying in degree, in the spermatozoa, which prevents the ovum or foetus reaching maturity, and thus causing abortion at different stages of gestation. This impotency may be temporary or permanent, and is the cause of many cows being spoiled; for, in addition to the risks of disease set up by abortion, the repeated inefficient service of such bulls often produces such an irritable condition in the uterus of the cow, that from being a sure breeder she is reduced to a doubtful one.

Abortion may be due to specific disease of the generative organs. I know of one disastrous outbreak that was, in my opinion, clearly traceable to this cause. A bull was freely used, before it was observed that he was suffering from gonorrhœa.

The disease was spread through the herd, and, although all were treated and apparently cured, non-breeding and abortion were continued and general. From this it would appear that this disease, fortunately very rare in animals, leaves a taint behind, which prevents the maturing of the ovum or the foetus. Many believe, and I agree with them, that abortion may be spread by sympathetic action, set up by the act of abortion taking place in a herd, and by the smell given off by the materials and products of abortion. Cases are quoted in which premature birth has been brought on suddenly by the natural act of parturition occurring amongst in-calf cows. Such cases are evidently due to sympathetic impulse, and point to the advisability of isolating cows when about to calve, and also, that if the natural act of parturition can produce such effects, the unnatural diseased act of abortion is likely to be followed by similar results.

Cows are exceedingly sympathetic and inquisitive, they carefully smell and touch objects with which they are not familiar; they have great aptitude for finding decomposing putrid matter that may be lying about pastures; and if found by one, the remainder of the herd are quickly drawn to the spot. Uterine discharges have particular attractions, and excite in cows a special and uniform action, bulling. This imitation of the male act of copulation by the female is, so far as my observations go, peculiar to cows; and, taken with the fact that uterine discharges under certain conditions become infective and poisonous, capable of spreading special and even fatal diseases, it is not a great stretch of imagination to believe that the products of abortion give off a germ or scent which, under favourable circumstances, is capable of reproducing the disease. This view is held by some continental and American veterinarians, who believe that abortion is caused by a special germ, a micro-organism which may be introduced into the system by food—into the lungs by the dust that rises and floats in the air, or into the uterus by way of the vagina. I question if this is so, but I can easily understand that abortion may be, and is, caused by septic putrefactive germs, germs which we know are capable of producing serious and fatal diseases, and diseases which are preventable by the adoption of antiseptic measures. The idea that abortion is spread by smell is evidently an old one—as shown by the keeping of goats in some herds, and the use of tar in others.

A frequent cause blamed is ergotised grass, and, knowing the medicinal properties of ergot, this is natural. I confess that I have no personal experience of this cause, nor can I get any direct and conclusive evidence respecting it. My investigations, however, lead me to believe that it is often innocently

blamed—blamed because the true cause was not discovered; and further, that instead of being a frequent cause of abortion, it is an exceedingly rare one.

The causes in operation to produce abortion, although numerous, will, when the subject is better understood, be found much less mysterious than they are now generally believed to be. It has been too much the custom to look for special and unusual causes, neglecting and ignoring the vital importance of apparently small, but important details of every-day management; errors in which, such as improper food, impure water, unsanitary surroundings, want of care and observation in mating, and the effects of certain diseases, will be found amply sufficient to account for most cases, and that a centre once established, the disease, unless great care is observed, may become general in a herd. Further, that abortion, however caused, leaves the uterus in an irritable weakened condition, disposed to repeat the diseased action; and that, unless a long rest is given to it, all our efforts to arrest the disease will be fruitless.

Is it infectious?—The general impression amongst breeders is that it is so, but there are a few observers who deny this. Whilst admitting that many cases occur that are traceable to accidents, disease, and dietetic errors, there can, in my opinion, be no doubt that the disease is capable of being spread by sympathy, by smell, and by mediate contact, the bull acting as the carrier from cow to cow. I therefore look upon it as infectious, and treat it accordingly.

After-consequences.—Abortion once established in a herd, it is almost impossible to say what the ultimate results may be. When its appearance is general and almost simultaneous in a herd, as when caused by impure water, but which is at once detected and remedied, the cows, if rested, not served until the uterus has perfectly recovered its healthy tone, will as a rule, when free from tubercular disease, breed again; but if the cause remains undetected and continued, or disease is set up in the generative organs, the results become disastrous. In addition to loss of calves and keep of herd, there will be a new bull or bulls to buy, and many of the cows will never breed again; they are rendered useless except to the butcher. The non-breeding depends upon the diseased condition of the uterus and vagina; the former is primarily affected, but the latter soon takes on diseased action. This is shown by irregular and frequent œstrum, accompanied by abnormal discharges. The uterus may simply be in an excited condition, which is often set up by improper service—service too soon after either calving or abortion—but the majority of these cases are due to malig-

nant disease, and that may with great safety be predicted to be of the tubercular character.

Treatment.—Promptly isolate all cows that have aborted, or in which the premonitory symptoms of it are observed. Destroy the aborted calf, membranes, and discharges; do not bury them in a manure-heap, or in any place to which cattle have access, but in some place where they cannot possibly do any harm. Disinfect the place where the abortion occurred, and the cow in her seclusion; this must be continued for some time. Have the floor, bedding, manure, and air saturated with the disinfectant, and if no recognised disinfectant is at hand, use quick-lime freely. If possible, find out the cause of the abortion; if successful, take immediate measures to prevent further mischief. Keep the patient on light sloppy food, attend to her general health and the condition of her bowels.

If the uterine discharges are copious and offensive, or the membranes are attached, wash out the vagina with tepid water, containing Sanitas or Condy's fluid. This is best effected with the aid of an enema funnel, and may be done once or twice a day, gradually leaving it off as the case progresses towards recovery. Above all things do not attempt to serve the cow again until you are sure she is perfectly clean and coming regular to her three weeks: it is wise even then to miss her for a time or two. Attention to this is most important, for not only is the cow likely to be damaged by too-early service, but the bull also may be contaminated. Give no cake until the cow is again safely settled in calf.

If the diseased condition of the uterus does not show early signs of abatement, the disinfectant wash may with advantage be replaced by one containing alum, tannic acid, or sulphate of zinc. The two former are safe agents to use, the latter requires care. Should the disease still continue and the cow become what is known as a buller, get rid of her as soon as possible. I have experimentally treated and carefully watched some of these cases from their beginning to their end in the slaughter-house, and with no good results; they set at defiance all treatment, and, the malignant disease found, post mortem explains why they do so.

If kept on to try treatment, they must be strictly isolated; but the best and only satisfactory plan is to cast them from the herd. There should be no hesitation about this, and if there are grounds to believe that the bull is at fault, either originally or by infection, the sooner he is replaced by another one the better.

Recommendations.—All breeding animals should be kept in as natural a condition as possible. The food should be good in

quality and apportioned according to the breeding state they are in; remember that the foetus as well as the cow is to be kept in a growing healthy condition. Avoid the practice of giving inferior and refuse food to in-calf cows. Be very particular respecting the purity of the water supply; neglect of this is a fruitful cause of abortion. See to general sanitary arrangements, ventilation, pure air, and good drainage; use disinfectants freely. In the fields, keep a sharp look out for decomposing putrid matter, which effectually destroy. Exercise is most important; even in winter, cows should be let out for a short time each day. Before service, be sure that the generative organs of both animals are healthy. Where possible, split up the herd into small lots, cows with bull calves, cows with heifer calves, cows and heifers to serve, cows and heifers settled in-calf, and doubtful breeders by themselves, which do not serve with a valuable bull, or unless they are regular.

Attention to these details will do much to prevent and modify outbreaks of abortion; but in connection with this subject there is another important deep-seated and common enemy to fight, and to which I have already directed attention, namely, the insidious pest—tuberculosis. This disease, known in some districts as consumption, wasting, clyre, &c., is pre-eminently hereditary, and is sure, sooner or later, to develop itself in some form. Animals and families in which it is known to exist should therefore be avoided. More attention should be paid to nature's law, "the survival of the fittest," and only sound vigorous animals bred from. Constitution and breeding records should be as carefully enquired into as pedigree, for they, like other peculiarities, are transmittable, and may be as surely cultivated as any other characteristic of a family.

XXI.—*Rickets, Bone Softening, and Paralysis in Lambs and Young Sheep.* By W. ROBERTSON, Principal of the Royal Veterinary College.

AMONGST lambs and young sheep, during the first year of their life, there is in certain districts of Great Britain, and on particular soils under ascertained conditions of cultivation, a very serious form of disturbed nutrition of bone, which, although well enough known, has not yet received the attention it seems to deserve. Under what I am disposed to regard as imperfect or mal-development and nutrition of bone-tissue in these animals, I would now desire to speak of what have hitherto been regarded as at least two distinct diseases:

1. That condition recognised as "rickets," "weak back," or "paralysis" of lambs, peculiar to animals the progeny of ewes which have been fed during the middle and latter periods of gestation upon materials, generally turnips, grown upon certain soils under particular conditions of cultivation.

2. A condition in which the bones of the skeleton, chiefly of the limbs and of young sheep, gradually become decalcified, rendering them unfit to serve the purposes of passive organs of locomotion, and liable to be fractured from trivial causes.

That these two conditions, apparently so dissimilar in their attractive features, are in their essential nature the same, I hope to be able to prove as we advance in the consideration of the subject, and, in particular, as we examine the character of the change which has occurred in the bone-elements in each. In the one, that recognised by the terms of "rickets" or "weak loins," which has hitherto been regarded as a primary disease of the nerve centre, the spinal cord, there appears evidence to satisfy that this latter structure is only affected in a secondary manner; the primary inducing factor being change in the bone-elements forming the canal in which the cord is lodged. In the other, bone-softening and fragility are the result of nutritive changes occurring in the bones themselves. In the one case the bone changes are mainly, if not entirely, confined to the central or axial portion of the skeleton; while in the other, the limbs or appendicular parts are the situations of the change. Both these manifestations of disturbed bone nutrition possess the common feature of liability to appear on soils of the same general character, such soils evidently influencing the character of the food supplies which are grown thereon.

1.—"RICKETS," "WEAK LOINS," OR "PARAPLEGIA."

General Characters and Distribution.—This condition of impairment, or loss of power, of movement, specially of the hind extremities, although occurring occasionally amongst sheep of one year old, is unquestionably in an especial sense a disease of lambs, many of which, in decided outbreaks of the disease, are seriously affected from their birth. The affection, when fairly developed, has no tendency to recovery, rather may we expect aggravation of symptoms or a fatal issue. The localities where this affection is encountered, although they may be widely separated, are on examination found to possess many features and characters in common. The soil is of a light or moory character, containing much vegetable matter resting on what is known as "moor band" or "moor pan,"

gravel, or sand. This, as long as it remains in its natural condition, may be regarded as a fairly healthy sheep walk; when broken, however, by the plough, and treated with an application of caustic lime, it is at once converted into a condition the opposite of healthy. Immediately attendant on this treatment the chief affections, and the most inexplicable ones which make their appearance amongst sheep confined to these soils, are this transverse paralysis or weakness of the loins in lambs, and bone fragility in young sheep. Whether aged sheep might contract the latter affection if retained long enough upon these situations, and under the other conditions where paralysis is observed in lambs whose dams have been fed from the roots grown there, I am not able positively to state. They may certainly be folded upon these lands, and consume the roots grown there for lengthened periods, without exhibiting untoward symptoms. The same treatment may not be carried out with parturient or great ewes during any stage of gestation, but particularly in the middle and latter, without entailing serious results in a large proportion of the lambs born of these ewes, in the form of weakness of the posterior extremities, or complete paralysis.

The prevalence of this paralysis and its fatality bear a direct relation to the treatment which the soil has received by being stirred and dressed with lime, the power of inducing the affection gradually becoming less as the period from the tillage and liming is increased. In some districts there is a danger of confounding this paralysis of lambs with other affections of the nervous system which possess some resemblance to it. Of these the chief are "*Louping ill*," and a form of "*Sturdy*" or "*Gid*," where the parasitic cyst is situated in the posterior part of the brain substance. From both of these, however, it is easily enough distinguished. From the manifestation of sturdy, to which I refer, it may be differentiated by the absence of convulsions, the possession of consciousness, and the disposition of this paralysis to exhibit truly enzootic characters, i.e. seizing upon a number of animals of the same flock in the same situation, together with the absence on after-death examination, of any cystic parasite in the nerve centres, brain, or spinal cord.

From "*louping ill*" it is distinguished by its strict confinement to the lambs, the ewes not being affected, together with the absence of convulsions, its steady progress when once appearing in a flock by its not being confined or influenced in its outbreaks by periods of the year, and by the absence of ticks on the sufferers.

Causation.—This particular paralysis, or defective power

of movement of the posterior parts in lambs, if not always associated with the state of bone-fragility in young sheep, observed on particular soils when placed under cultivation, is invariably met with where the soil is similar, and where like extrinsic agencies are in operation. There seems little doubt that its existence depends upon dietetic influences, which primarily arise from the condition of the soil, and which influence animal nutrition through determining the character of the plant-life developing there. Although we may not be able to state exactly what elements are wanting, or what are redundant, we are yet pretty certain that particular soils, when treated in a certain manner, will give rise to this affection in lambs which are the offspring of ewes that have been fed during gestation on the crops of such soils. It is not absolutely needful that the ewes should be located on these soils to produce the disease in their lambs; the same results will follow even when they are placed in situations not subject to this condition, provided that they are supplied with food grown upon the soils in question.

To secure a development of this disease, the conditions which require to be fulfilled in connection with light moory pasture lands are, that they shall be brought under tillage, and have a dressing of caustic lime. Either of these modes of treating these soils may incite conditions favourable to its appearance, but are more likely to secure such when both are carried out at once. While it is probable that the application of lime alone as a top-dressing is more likely to be followed by the appearance of the disease, than the simple breaking of the turf by the plough, it seems to matter little, whether after having been treated as indicated, these soils are at once laid down to grass or employed at first for root-cropping. In either form the food-material grown upon them may not be used freely with impunity for breeding ewes or for young lambs. The most disastrous results are observed to be attendant upon placing pregnant ewes upon turnips grown on these lands, and retaining them on such until parturition; while scarcely less serious consequences follow turning ewes, with apparently healthy lambs, upon the same soils, which have been seeded without a previous crop.

That the lime which has been applied when the pastures were broken up is a chief factor in the development of the hurtful influence, is to some extent proved by the fact, that the virulence of the disturbance seems to be in direct ratio to the quantity employed, and the proximity to the period of its application. That it is not in itself hurtful, but rather by virtue of its action upon the particular soil, is probable, when we regard the impunity, or rather benefit, with which the same agent may be employed on lands of a different character. It would appear,

rather, that the lime, entering into combinations with certain constituents, vegetable or mineral, of the soil, tends to produce or liberate agents, which, being taken up by the plants grown there, operate prejudicially on particular organs and tissues of the sheep. Turnips, grown on these soils under the conditions noticed, I have seen freely used for cattle food, and have not observed any effects similar to those which are encountered in sheep. Any chemical analysis which I have had undertaken, of roots or soil, where the affection has prevailed, has not accounted in a satisfactory manner for the existence of the disease. Experiments which have been carried out upon sheep themselves, prove that the paralysis may be induced by attention to the placing of the animals in the situations which I have stated, and most certainly in the lambs when the ewes are operated upon, from the middle period of gestation on to lambing. If any difference exists in the severity of the seizures, it seems to be in the case of animals which have been brought from other situations or lands where this disease is not known. Although it is not asserted that anything approaching to acclimatisation exists, it is probable that animals hitherto exempt from the dangerous influences of those soils, suffer more severely than others previously exposed to them. In some districts certain breeds or varieties are said to be more subject to the disturbance than others.

Anatomical Characters.—An examination of such lambs as have succumbed to the disease, or which may be slaughtered when affected, does not disclose well-marked structural changes. With some there may be evidence of defective nutrition, or anæmia, shown in the blanched and lax condition of the entire muscular system, with alterations in the vascular system as well. The greater number, however, show no prominent alterations explanatory of the symptoms exhibited during life.

It has been frequently stated that a careful examination in well-marked cases shows evident changes in some parts of the central nervous system. These lesions, it is said, are more particularly seen in the spinal canal and cord. In the cavities of the coverings the normal quantity of fluid is increased, while changes of a varying character have, it is asserted, been noted in the intimate nerve-elements. That both of these conditions may be seen, I feel satisfied; that they are invariably well marked, I do not believe. The former I have noticed with more constancy than the latter, of the existence of which, save in very rare and prolonged cases, I have never been able to satisfy myself. Probably of more importance, however, than changes of a doubtful character, which may be observed in the intimate structure of the cord, are alterations in the bone-elements which

form the canal in which the cord is lodged. Here, with an average amount of care in conducting an examination of the cord and vertebral canal, it will, in the great majority of cases, be clearly enough made out that any changes observed in the cord are more probably the result of pressure, proceeding from change of form in the bony canal in which it is lodged.

When making this examination, it is better to carry out a longitudinal section of the bony column through the canal, than to lift the roof simply from the cavity, by dividing the arches. After making this longitudinal section, examination will disclose the fact that the cord exhibits regular portions, more or less constricted, these constrictions being opposite to the points of union or articulation of the segments of the spinal column. The bulging of these at the intervertebral cartilaginous discs by which they are connected, and more so the bulging and increase in bulk at the ends of the bodies of the individual segments, close behind the epiphysial cartilages, are the cause of the production of an uneven floor in the canal; this narrowing results in pressure and constriction of the contained cord, with an increase of fluid in the cavities of the investing membranes. This swelling of the individual extremities of the separate portions of the vertebral chain is dependent on the imperfect bone-development incident to a state of general mal-nutrition. In these very young creatures the local evidences of the general disturbance are chiefly confined to the bone-elements constituting the spinal column; in older ones the lesions exhibit themselves more in the passive organs of support, the bones of the limbs.

Symptoms.—The chief as well as the diagnostic indications of the affection are those associated with, or proceeding from, disturbed motorial power. In many instances where the disease appears as a virulent 'enzoötic, numbers of lambs, although of full size and carried the full time, are never able to rise from their birth. With the greater number, however, the evidence of defective movement of the posterior parts most distinctly exhibits itself when the lambs have reached a few weeks old, while a certain proportion may appear well enough for a much longer period. In cases where this affection is known to exist, a little careful watching will soon detect the affected. On any little excitement or attempts to gambol, the animal will stagger or fall over; while in making an effort to run, the hind limbs cannot be brought forward in conformity with the other parts, or with the will of the sufferer. From the felt difficulty to execute movement, all sufferers from this impairment of power are disposed to rest much, only rising, or making attempts to do so, in response to the calls of appetite. When

other adverse conditions of a climatic nature are in existence at this time, many of the helpless lambs will become attacked with arthritic, *i.e.* joint, disease,—the disposition to rest on the cold ground, together with defective alimentation, operating as immediately inducing factors in the production of joint-disturbance.

As regards older animals—sheep of the first year, which become affected with this weakness of the back—they are chiefly those which have from their infancy been reared, for intervals at least, on the situations subject to it, or whose dams, during pregnancy, have been similarly treated. The disposing influences have not in their case been powerful enough to determine its appearance when lambs; but being to some extent continued, will still, as hoggets, claim a certain number of victims; while if attempts are made to fold them on turnips on the lands indicated during the first winter, without due attention to allowing some additional food-materials, a considerable loss may be anticipated. The impairment of motorial power in these instances will most surely be developed should the state of the weather be such that the land on which they are folded becomes saturated with water, so as to render travelling over it attended with difficulty.

2.—BONE-SOFTENING, “MOLLITES OSSIUM.”

Definition.—A condition in which the bones of the skeleton, chiefly in young sheep, gradually become decalcified, rendering them unfit to serve the purpose of passive organs of locomotion, and liable to be fractured from trivial causes.

Nature and General Characters of the Condition.—This, like the preceding affection, is peculiarly a disease of particular localities, being only met with on certain soils, and on these when interfered with as previously described. The impairment of nutrition is here confined to, or only exhibited in its purity in, the bones of the extremities. It is less liable to affect the very young than such as have reached, or nearly reached, maturity. The essential materials of which bone is formed do not seem to be wanting at the exact period of their formation; but having been elaborated, and their growth so far completed, certain portions are more rapidly removed, or on removal in the process of growth, are not replaced. The inorganic or earthy portions seem to be replaced by excess of the softer organic constituents.

Although I am disposed to regard this affection as a general disease affecting the nutrition of this particular tissue—*i.e.* bone—it may, and has, I believe, been regarded in another light,

viz. as merely a local affection resulting from changes in the medullary as well as compact tissue of bone. From the fact, however, that prevention may be secured by a properly regulated diet, this latter view appears less tenable than the other.

Causation.—Like the previous manifestation of defective bone-nutrition spoken of as affecting lambs, this, as respects the simple recognition of the conditions which, when brought to bear on young sheep, operate in inducing fragility and softening of bone-tissue, is easy enough. It is when we come to particularise the steps by which the disturbed nutrition is reached, that we meet with difficulties. The conditions under which fragility of bones in young sheep is met with are characters of soil, and food-production, precisely similar to what have already been noticed in the previous disturbance appearing in lambs. The continuance of this disease, or its liability to occur when started, seems to be governed by the relations of proximity to the period of cultivation, and the application of lime exactly similar to what has been already mentioned. So well known to the majority of sheep-farmers is this tendency of these already mentioned lands, when treated as described, that the dread of the occurrence of one or other of the diseases now under consideration operates largely in restricting the breaking-up and the improving of them. In both these forms of disturbance of bone-nutrition, we may speculate as to the *rationale* of the action by which the ingestion of food produced from such soils operates in inducing the changes; but until further chemical and experimental investigation has been carried out, we have little solid ground on which to stand.

Anatomical Characters.—By far the most marked, indeed, the only obvious, structural changes are in connection with the bones of the extremities. These, along with their covering membrane, give to the ordinary observer the idea of increased vascularity. There is not, however, as in ordinary rickets, any increase in bulk or extra development of the extreme ends of the bones, nor are the changes greater at their junction with the shaft. The outer shell of compact tissue does not appear unnaturally softened, only unnaturally thinned, the medullary canal being of greater capacity and the open tissue increased. Extending into the interstices of this tissue and throughout the medullary canal, there is an abundance of soft reddish pulp, largely made up of fat globules, nucleated cells, and blood corpuscles. This material, while extending into the extreme ends of the bones, does not induce any evident increase of bulk in these parts. The articular cartilages, although not destroyed, seem thin, and are spotted over their centres with dark-coloured markings. These look as if

removal of structure might follow, but ulceration I have not met with. The bones, as a whole, are not disposed to bend or alter in shape; but from the thinness of their shell of compact tissue, they are very liable to fracture under trifling exertion. The periosteum—bone-covering—is thickened throughout its entire extent; the under-layer of active cells seems engaged in a formative process somewhat similar to that which is observed in bone-production. The external surface of the bone-shaft is less smooth and polished than in healthy animals. Other bones of the skeleton, as the scapulæ and pelvic bones, may in some instances give evidence of changes of a similar character.

Symptoms.—Apart from the fatal results of this alteration of bone-structure, in fracture of bones, particularly those of the limbs, it can scarcely be said that there are any indications by which these changes may be detected during life. Following the occurrence of several such cases in a flock, carefully conducted examinations may detect indications of the local bone-change. Generally, however, to the ordinary observer no indications of disease present themselves prior to the occurrence of fractured limbs. These rarely appear in numbers at one time, but are irregularly distributed over a lengthened period. The causes which seem to operate in their immediate development are apparently the most trivial. The occurrence of rain sufficient to thoroughly wet the ground, causing the animals to dip excessively in moving along, may thus operate. The rough handling of the flock with a dog, or any attempt to seize some for examination, may each lead to the production of a fracture. The more numerous instances I have noticed happen during moonlight nights, when sheep are easily disturbed, or, independent of disturbance, are disposed to gambol. The existence of stake-holes left in fields, from the shifting of hurdles or nets, are also fruitful causes of these fractures. In the fracture itself there are some slight differences from what occurs in a healthy bone when broken. It is attended with more effusion, and the immediately contiguous parts are at once more swollen, softer, and less well defined. Cases of compound fracture are much rarer than simple ones. Any attempts to produce reduction of the fracture and reunion of the parts are greatly more uncertain than in otherwise healthy animals.

Treatment.—This, in so far as relates to treatment of the bone lesions, when these have occurred, is futile; carried out in the direction of prevention, it is tolerably successful.

When from previous experience such a condition of the skeleton is apprehended as noted under this latter disturbance, the addition to their ordinary food, *i.e.* what is obtained from the lands on which they have been reared and are located,

whether grasses or roots, of materials fairly well supplied with albuminous constituents, is certain to produce conservative results. For this purpose a moderate quantity of linseed-cake, or cotton-seed cake, alone or mixed, or of oats with bran, beans, or Indian corn, is usually sufficient to give a healthy character to nutrition as carried out in bone-tissue. When such additional feeding-materials have not been supplied from an early period of the creature's life, and this disease should suddenly assert itself, a similar course of management, combined with quietness and avoidance of disturbance, may mitigate the extent of the loss, and enable the sheep to be fattened for the butcher. Their retention as breeding animals is not to be advised.

In the management of the paralytic affection of the younger animals—lambs—the employment of curative measures is not to be recommended. Under the most careful and judicious treatment it is found that only a very small proportion recover, even so far as to enable them to be fattened, while the expense attendant on their treatment is not compensated for in the ultimate results.

Under skilful management I have found that a few of the better and stronger lambs recover, so far as to be able to move in a quiet manner, and gather their food, the tendency to death being after a little time overcome. The treatment which in these exceptional cases I have found attended with best results, has been that of supporting the creatures with artificial food of an easily assimilated and nourishing character, such as gruel made from linseed or pea-meal, with milk given in moderate quantities and frequently. A dry comfortable location must be provided for them; and such natural food as they are disposed to take should be given in moderation. Of medicinal agents the best seem to be preparations of iron, as the carbonate or phosphate, with strychnia and quinine. I only mention these matters seeing that experimentally I have found them useful, not that as a system I can recommend their adoption as a pecuniary success.

To preventive measures, however, every attention ought to be directed; and there is reason to believe that these, when carried out strictly and judiciously, will be found attended with a large amount of benefit. Seeing that it is a rare circumstance for any farm to be composed entirely of the light moory soils, which under the conditions already mentioned are liable to exhibit this disease, arrangements must be made to keep the breeding ewes off the disease-inducing situations during the critical period of the year. Where lands of the character indicated have been treated as described, neither pregnant ewes, nor ewes with

lambs at their feet, ought to be located there, either on roots or young grass, for some years. During the first-half of gestation the ewes are less liable to be injured by being fed with food grown on these soils; still, as it is hazardous to experiment too far, it is a safer policy to consume the roots grown there with a different class of sheep, such as may be preparing for the butcher. These, under any circumstances, are less liable to suffer damage, and are, moreover, generally receiving artificial food, so that they are not dependent altogether on what is produced from the soil. When it is impossible to afford to breeding ewes during gestation location and food on the farm without the probability of this serious disease appearing in the lambs, it will always be an economical plan to have them removed to some other district during the middle and later stages of gestation. When such an arrangement is being carried out, preference should be given to the situation where the change will be as great as possible. With ewes from localities deemed dangerous owing to the occurrence of this disease, a satisfactory change is generally obtained by placing them on good clays, or on soils which rest on a sandstone formation. While consuming even roots where they have been removed, it is advantageous to add a small quantity of some artificial food, either cake or corn. On being returned to the lands from which they had been taken, it will still be needful to guard against grazing them on such situations as are liable to induce the affection; for although less liable as they get older to suffer from the paralytic attack, very little liberty may be taken during the first year of a lamb's life.

In all cases where the greater portion of a farm is composed of the class of land already noted, care should be exercised, in case of contemplated improvement by ploughing and lime-dressing, that it be carried out in sections, at intervals sufficiently long to obviate the chance of having no portion of land to fall back upon as established healthy sheep-ground; while it will be found better to apply the lime in small quantities repeated, than in larger amounts at longer intervals. Where the unfavourable conditions have already been developed in the soil before the appreciation of the disease has been awakened, it will be necessary to change the stock from a breeding one to another less liable to suffer from such a serious malady. Gradually in a few years the conditions become so altered, that a ewe-stock may with comparative safety be again placed upon the land.

3. SUMMARY.

After a careful consideration of these two diseased states, particularly in their apparent causation, we can scarcely fail to

feel that there may yet be a closer relationship than at first appears in all that pertains to their essential character. Both are evidently the results of disturbance of nutrition, being essentially dependent for their existence on causes purely dietetic, while both may be counteracted by supplying an appropriate food supply. It may be thought that the gross lesions in the case of the one affection, viz. that where the stability of the bones of the limbs is chiefly at fault, must point to conditions essentially different from those which operate where the changes seem primarily and chiefly located in the great nerve centres. This apparent difference in the character and relation of symptoms to textural changes may, however, be capable of a not unsatisfactory explanation.

If we regard both affections as only manifestations of a particular perturbation in the nutrition and development of bone elements, it is possible to show that the diagnostic symptoms of both are capable of being linked to this one unnatural condition.

In referring to the anatomical characters of enzoötic lamb-paralysis, "*Rickets*," attention was directed to the state of the component segments of the vertebral chain. Here it was noted that many cases exhibited an unnatural growth or development of the individual pieces of the bony canal. The floor of the canal, in which rests the spinal cord, it was observed, was liable to exhibit an uneven and undulating surface from peculiarities in the growth of the separate bones. The swelling, from appearing in each separate piece at their ends or extremities, was consequently most marked at the junction of the several segments. Wherever this irregularity existed, the consequent intrusion on the cavity of the spinal canal is explanation sufficient of disturbed or destroyed nervous power through pressure on the contained cord. Such changes in the growth of the bones forming the vertebral chain are well known to accompany the same disturbance in bone development in the limbs. Or the same fact is better put by saying that disturbance in bone growth, in the same variety of animals, may, when occurring at one particular age, exhibit its results in the central skeleton—the head and spinal column—while at a different period of life the same disturbance is shown in changes chiefly confined to the bones of the limbs.

Viewed in this light, both these affections come to be regarded as merely types or modifications of that general disturbance of bone nutrition and development included under the term "*Rickets*." This general state of ill-health has not usually been considered as congenital in any animal. Still, viewed in a large sense, particularly as to the influences which seem to

favour the appearance of these affections, together with the structural changes which both prominently exhibit, I am disposed to give this view at least a favourable consideration.

In the larger number of animals of all tribes which are liable to suffer from rickets, I am aware that when occurring in early life, the limbs, and not the central bony column, is the situation where the abnormality in bone structure is chiefly encountered. Now, although in both these diseases we have been considering, the one part of the skeleton suffers considerably in excess, in neither can it be said that the other is entirely free from change. In those where the alterations are chiefly connected with the spinal portion, the bone-elements of the limbs in many participate, although to a less extent, and *vice versâ*.

As the result of my experience of both these states, I have found that where the prominent symptoms are those of impaired innervation, the influences operating in the induction of the diseased state have been brought to bear on the ewes during gestation; while, where the prevailing phenomena are those of fragility of the bones of the limbs, the disturbing influences have been in operation on the lambs themselves, the dams having been kept away from the agencies believed to develop the paralytic symptoms.

It seems that, having passed the periods of infancy and early maturity, sheep are comparatively little liable to show this disturbance of bone nutrition; at least, I have rarely encountered it in any of its forms in animals which have reached adult life.

XXII. — *Report on Agricultural Education:—a Summary.*

Part II.* By HERBERT J. LITTLE, Professor of Agriculture and Rural Economy, Royal Agricultural College, Cirencester.

IN our previous survey of the subject of Agricultural Education in Continental countries, we found one constant and invariable feature to prevail. In all these European States the schools are either established or more or less assisted by Government. In this country we have always prided ourselves upon relying on private enterprise. It may be doubted, however, whether some State assistance other than the meagre grants already afforded, would not have been a real help to the agriculture of this country in the past. Except by payment for results obtained in certain schools, the little that has been done by the State may be summed up in two facts:—

* Continued from p. 164.

- (1.) The recent establishment of a Chair of Agriculture at the Normal School of Science, South Kensington.
- (2.) A grant of 150*l.* a year towards the endowment of a Chair of Agriculture at the University of Edinburgh.

The few institutions in this country at which agriculture is taught, are either self-supporting, or depend for their existence upon voluntary subscriptions, or owe their foundation to the self-sacrificing labour of philanthropic individuals. The principle of the Education Department of the State in this country is to give its pecuniary rewards to the *teachers*, with a view of stimulating them to impart instruction; but in very few instances, and those mainly in elementary schools, has this principle been carried out so far as *Agricultural Education* is concerned. It is true that the Royal Agricultural Society of England and the Highland and Agricultural Society of Scotland have from time to time examinations in Agricultural Science, and that the object of these bodies is to reward the *learners*, with a view to stimulate the acquisition of further knowledge, either on their own account or as teachers in the future; but our Government steadily holds aloof from such a system.

It will be necessary to give a brief description of the principal schools and colleges where agriculture is taught in Great Britain, and afterwards to notice the influence of the two national Agricultural Societies.

ROYAL AGRICULTURAL COLLEGE, CIRENCESTER.

The Royal Agricultural College at Cirencester deservedly takes precedence in any review of what has been attempted or accomplished in Great Britain to promote the higher class of Agricultural Education. Although a school of agriculture existed in Ireland previous to its establishment, no institution of the kind, having for its object the technical instruction of agriculturists of any degree, had hitherto been founded in this country. The College owes its origin to an address by the late Mr. R. J. Brown to a meeting of the Cirencester Farmers' Club, held in November 1842, "On the Advantages of a specific Education for Agricultural Pursuits."

It is needless to record the various steps which led up to the establishment of the College, but it is necessary to note that by the persevering efforts of Mr. Brown and others no less than 12,000*l.* was raised by subscription amongst the nobility and landowners in various parts of the kingdom in a short time. Lord Bathurst, the owner of a large estate in the neighbourhood, then offered a farm of 400 acres on lease for a long term of years, and the site on which the College now stands, on a

lease of ninety-nine years. A charter was obtained in March 1845, incorporating the governors, proprietors, and donors under the title of "The Agricultural College for Teaching the Science of Agriculture, and the various Sciences connected therewith, and the practical application thereof to the Cultivation of the Soil and the Rearing and Management of Stock."

This sum of 12,000*l.*, however, was soon found to be inadequate to the completion of the College, irrespective of farm buildings and other essential adjuncts. It was, therefore, provided that the capital should be increased to 24,000*l.*; but a premature extension of the College by the immediate erection of some buildings, which it had been originally intended to leave over to some future occasion, soon involved the promoters in further debt.

In consequence of no precedent existing in this country as a guide to the committee of management, mistakes of various kinds were committed from time to time in the early days of the College. Among such mistakes was the amount of the fees first fixed for the board and instruction of students, which was placed at the ridiculous figure of 30*l.* per annum only, a sum which scarcely met the demands caused by the keen appetites of the students, leaving interest on capital, cost of tuition, &c., entirely unprovided for. In 1848 it was doubtful whether the institution could be carried on any longer. The bankers' account was overdrawn to the amount of 10,000*l.*, and it seemed as if the first attempt at agricultural education on a large scale was to become an ignominious failure. Under these circumstances Mr. Holland, a local landowner and then vice-president of the institution, nobly took upon himself the responsibility of the existing debt. At subsequent meetings the late Earl Ducie, Earl Bathurst, Mr. Sotheron Estcourt, and the late Mr. Langston, joined Mr. Holland; and through the joint exertions of these gentlemen some 30,000*l.* was raised. It now became necessary to apply for a supplemental charter, in order to vest the management of the College in these gentlemen during the continuance of their liabilities, and to give them such security for their advances as the nature of the institution admitted of. This further charter was obtained in July 1849; and the corporation was empowered to obtain an additional capital of 20,000*l.*, if required, the guarantors also being appointed a committee of management.

I shall not go through the other difficulties which characterized the management of the College in its early days. Suffice it to say that they were numerous and almost insurmountable. The difficulty of securing suitable teachers was not the least of them, though distinguished men were to be found occasionally amongst their number. The names of Professor Wilson, who

has recently resigned the Chair of Agriculture at Edinburgh, and the late eminent Dr. Augustus Voelcker, will be found among the early Professors of the College. The latter gentleman, indeed, may be said to have founded his great reputation during his period of office at Cirencester. The fees for pupils, originally fixed at 30*l.*, were increased to 50*l.*, and afterwards to from 70*l.* to 90*l.*; but it was not until about 1859, when the Rev. J. S. Haygarth was Principal, and Mr. John Coleman was Professor of Agriculture and Farm manager, that the College attained any considerable degree of prosperity. There were then, however, nearly 100 students on its books, a considerable proportion of these being out-students, who paid 30*l.* or 40*l.* a-year for tuition, and were all profit. During most of this time the farm management was a source of considerable loss, and in about 1865 it was determined to separate the farm from the College. The wisdom of this proceeding has been fully justified by the results. For some years past the tenant of the farm has been Mr. Swanwick, an old diploma student of the College, a breeder of excellent stock, whose name is known in all the Showyards of Great Britain, and one who has done all in his power to make the farm useful as an educational institution.

At the present moment, under the Principalship of the Rev. J. B. McClellan, the College enjoys an unexampled prosperity. For some years it has been quite full, the number of out-students is large, the staff efficient, and the work of a thorough kind. "The opportunities for a thorough insight into natural science are superior to those available at any College I know of."

"The College buildings include a museum, lecture theatre, numerous class rooms, chemical and biological laboratories, private rooms, studies, chapels, dining hall, library, reading-room, dormitories, lavatories, and apartments for the resident Professors. The external appearance of the Gothic building, with its long front of 190 feet facing the south, the internal arrangements, and the contents of the museum, library, and laboratories, are all worthy of the eminent men who founded the College and of the sacrifices which they made on its behalf. As part of the establishment should be mentioned the botanic garden, veterinary hospital, forges, workshops, &c.; while it need scarcely be added that means of physical recreation are adequately provided, except to point out an almost constant difference in this respect between English and Continental educational establishments."

About 85 in-students can be accommodated in the College building. These pay 135*l.* per annum, or 45*l.* per term, each having a separate cubicle in one of the dormitories, and sharing a study with one companion, or by an extra payment

of 10 guineas per term, having a private room as sitting-room and bedroom combined entirely to himself. Out-students pay 75*l.* per annum, or 25*l.* per term; they must be at least 21 years of age, and except in special cases must live in the town or neighbourhood in a house approved by the Principal.

There is no entrance examination, but pupils are required to be at least 18 years of age, and are expected to have received a good general education.

"The ordinary College course extends over two years, or six sessions, but for the diploma over seven sessions; the ordinary lectures and practical classes on the several subjects, occupying two years, and the final examination for the diploma taking place at the end of the session following. Instruction is given both theoretically and practically, the former by lectures and laboratory practice, and the latter by demonstrations on the College farm, attendance at sales and markets, farm excursions, &c. The following is a synopsis of the order of studies:—

"*Terms 1 and 2, Class 1.*—Agriculture (soils, manures, implements, labour, buildings, &c.); Chemistry (inorganic); Book-keeping; Mensuration; Physics, Geology, Botany or Zoology; Veterinary Anatomy and Physiology; Drawing (plan).

"*Terms 3 and 4, Class 2.*—Agriculture (tillage, crops, &c.); Chemistry (organic); Book-keeping; Surveying; Physics; Geology or Botany or Zoology; Veterinary Pathology; Drawing (machinery).

"*Terms 5 and 6, Class 3.*—Agriculture (stock, dairy-farming, economics, &c.); Chemistry (Agricultural); Book-keeping; Levelling and Engineering; Physics, Mechanics, Geology or Botany or Zoology; Veterinary Therapeutics, Obstetrics, &c.; Drawing (design).

"Agricultural Law in the winter session, Building Materials or Construction in the spring session, and Estate Management in the summer session of each year.

"The progress of the students is tested by weekly and sessional examinations, the results of the former are posted every week on the screens of the College Hall, and the total results of both appear in the printed class and prize lists at the close of the session.

"The College farm is about 500 acres in extent, of which only one-tenth is permanent grass. The soil, like most Cotswold land, is very variable, and includes strong marl, stony brash, loam, and clay. The flock of 500 Cotswold sheep is of high excellence, as its continued success in the show-yard attests. The pigs are pedigree Berkshires, for which breed Mr. Swanwick has earned himself a name second to none. The general

management of the farm is according to the principles which regulate Cotswold farming of the highest class. Considerable varieties of crops are grown, but the general rotation may be described as the four-course. It ought to be mentioned that specimens of about sixteen leading breeds of sheep are maintained by the College upon its own land for the purpose of class illustration and instruction, and that specimens of the best breeds of cattle are fed in boxes during the winter and spring months, thus affording the students every opportunity of familiarizing themselves with the peculiar characteristics of the cattle of Great Britain.

“Those students who desire it have opportunities for taking part in all kinds of work upon the farm, and excursions are also made by the senior students to arable and dairy farms of excellence in the neighbourhood.

“Six scholarships, three of 25*l.* and three of 10*l.*, are awarded annually, namely, two every term, of 25*l.* and 10*l.* respectively, according to the results of the weekly and sessional examinations. These scholarships are open to all students of not more than six terms standing who are proceeding to the diploma. A very successful student may thus obtain as much as 75*l.* per annum.

“Six scholarships, each of 200*l.* a year, created by the Government of Bengal in 1880, with the view of promoting agricultural improvement in Bengal and encouraging the study of scientific agriculture, are tenable for two and a-half years each, and are open to certain native Indian graduates of the University of Calcutta.

“More than two hundred prizes are awarded annually. These consist principally of silver medals, certificates of honour, and books. Three gold medals are annually awarded, the ‘Ducie’ every April, the ‘Holland’ every August, and the ‘Haygarth’ every Christmas, the candidates being the competitors in the final examination for the diploma. No student is qualified to receive any prize, scholarship, or certificate whose general conduct is not satisfactory to the Principal.

“There can be no doubt that Cirencester has exerted a considerable influence in the agricultural improvement of the country. A glance at the list of the names of the three hundred or more gentlemen who have obtained the diploma of the College is quite sufficient to convince me that the influence of the College teaching has for many years been largely felt in agricultural circles, not only in the United Kingdom, but also in foreign countries and the colonies, and especially in India. In the years 1869 to 1882, inclusive, no less than twenty-eight College students took the first-class certificate of the Royal

Agricultural Society, and between 1858 and 1881 twenty-four took the diploma of the Highland and Agricultural Society of Scotland. It will be seen hereafter that these distinctions, and especially the former, are not conferred unless the candidate passes an examination more thorough and searching than that for many a University degree."

COLLEGE OF AGRICULTURE, DOWNTON, WILTS.

This College, which is an enterprise of a purely private nature, was founded in the year 1880 under the name of the Wilts and Hants Agricultural College. This title, however, was subsequently changed for the above designation. It is understood that it was organized with due regard to commercial principles, and that it has hitherto been not unsuccessful as a business undertaking. The building itself is an old farm-house, which has been adapted and enlarged for the accommodation of about forty indoor students. It contains a dining hall, common-room, lecture-room, and other offices, while laboratories have been established in the out-buildings.

As in the case of Cirencester, no preliminary examination is required of students, but it is requisite that they should obtain references as to previous general conduct. Out-students must be 21 years of age, and in-students at least 18. The charges are not unlike those of Cirencester, being 129*l.* a year for in-students, and 60*l.* for out-students. These charges include for the former, board, lodging, tuition, and laundry. According to the prospectus:—"Instruction is imparted by lectures, field-classes, practical work, and catechetical lectures, and there are weekly examinations, conducted on the farm, in the laboratories, and by means of printed papers. Each student is expected to keep a farm journal, and these books are inspected and reported upon at regular intervals."

The subjects of instruction are in almost every detail similar to those at Cirencester, and it is evident that the instruction in the latter-named College has been the model upon which the President has worked. Diplomas are awarded at the end of a two years' course, and a scholarship of the value of 10*l.* is offered at the end of each session. The board of examiners for the diplomas or certificates of membership consists, as at Cirencester, of the Professors of the College, assisted by eminent agriculturists. In addition to these diplomas, a certificate of proficiency in practical agriculture is granted to such students as do not compete for the first-named honours, but who, nevertheless, acquire a sound knowledge of practical farming, as shown by a satisfactory examination.

The distinctive feature of the Downton College is that its proprietorship and that of its farm-stock are vested in the President of its Council, Professor Wrightson. The farm is 550 acres in extent, of a varied character in its soils and produce. It is in the valley of the Christchurch Avon, which is employed for the irrigation of 45 acres of water meadows. There are also about 50 acres of dry pasture and marsh, which, together with the water meadows, yield pasturage for a dairy of 25 cows. The soil is of the character common in the South country chalk districts. Some of it is flat productive land of an alluvial character, with gradually rising fields to the downs above.

A heavy stock of sheep is maintained on this farm. About 700 ewes and ewe-togs form the permanent breeding flock. The ewes are lambed in January, February, and March, and are of the Hampshire Down breed. The lambs, according to the custom of the country, are sold either fat or in very forward condition at the great autumn fairs in the neighbourhood.

It is generally understood that the limited accommodation available at Downton has been taxed to its fullest extent. We have shown that the education is of a very similar character to that at Cirencester, and the classes of students are drawn from the same rank, namely, those of the upper and the wealthier middle classes of the country. At both places large numbers of students avail themselves of the course of education with the intention of emigrating or becoming land-agents and agriculturists in their own country.

THE CHAIR OF AGRICULTURE, UNIVERSITY OF EDINBURGH.

This Chair was founded in the year 1790, but with a stipend of only 50*l.* per annum, by the late Sir William Pulteney. In 1868, by the exertions of the Highland and Agricultural Society of Scotland, the endowment was increased by 300*l.* per annum, 150*l.* of which, as before mentioned, is paid by the Government, and the other by the Society. The total emolument of the Professor is now about 370*l.* per annum, and the fees payable by the students are 4 guineas per course of 100 lectures. The Highland Society endeavour to stimulate students to attend these lectures by offering annually ten bursaries of 20*l.* each towards their expenses. These bursaries are tenable for one year at the University in order to enable the holders to qualify for the Society's diploma.

The syllabus of the course of lectures delivered by Professor Wilson, F.R.S.E., F.G.S., is of a most comprehensive character, including in the first section the history of agriculture up to the present time; in the second section the general purposes of agriculture and the conditions affecting it; in the third section

the science of agriculture, that is to say, chemistry, geology, botany, and physics; and in a second division the mechanics of agriculture and the management of the land under the head of rotations, improvement of the soil, live-stock, economics, farm-engineering and construction, and agricultural policy, &c., are treated of.

Attendance at these lectures is quite optional with students, as the subject is not included in those required to be passed in order to obtain any degree. The attendance has never been very large, ranging from about 12 to 30 or 40, but it is understood that lately the attendances have increased, and in 1882 14 students qualified for their certificates. The majority of the students are sons of tenant farmers, and young men qualifying themselves for estate management or for farming in the colonies. There is no entrance examination, and no certificate of previous education is required.

A very important scholarship has lately been founded by the Misses Stevens of Bellahouston, in memory of their brother. This scholarship consists of the annual proceeds of 2000*l*. The scholar is required to visit and report upon the annual exhibitions of the four leading agricultural societies in the three kingdoms, namely:—

The Royal Agricultural Society of England;
The Highland and Agricultural Society of Scotland;
The Royal Agricultural Society of Ireland;
The Bath and West of England Society;

or such of them as the Professor of Agriculture shall appoint; and the report, if approved by the Professor, is to be sent to the agricultural journals for publication.

COUNTY SCHOOLS.

Agriculture is being taught to some extent in various County Schools in the kingdom; and although none of these can be called agricultural schools in the proper sense of the term, several of them have shown the possibility of agriculture being included in their ordinary teaching, by sending with success pupils to the junior examinations of the Royal Agricultural Society. Among such schools may be named

The Surrey County School, Cranleigh, near Guildford;
The Bedford County School, Bedford;
The Devon County School, West Buckland;
The Dorset County School, Dorchester;
The Norfolk County School, Elmham; and
The Agricultural and Commercial School, Aspatria, Cumberland.

By far the most successful of these schools seems to be the Surrey County School at Cranleigh. Here about 350 boys are boarded, lodged, and educated at an inclusive fee of 12 guineas per term, or 37*l.* 16*s.* per annum each. Of this number some twenty or twenty-five boys receive instruction in subjects bearing upon agriculture during a portion of the year. An extraordinary circumstance seems to be that these boys are not chosen with reference to the class of life to which they belong, or to their own future occupations. They differ only from the other boys in so far as they are better educated, from the fact of being at the top of the school.

The whole of these boys are entered to compete for the junior scholarships of the Royal Agricultural Society, whereas in the case of the rest of the schools enumerated above, only a select number, from one to a maximum of six, are specially prepared for that examination.

A list of the schools which have entered pupils for the junior scholarships of the Royal Agricultural Society, shows that from 1874 to 1882, inclusive, the Surrey County School entered 184 boys for examination for these prizes, 36 of whom took scholarships. In one year, 1874, as many as 27 boys entered. From no other school has there been, during those years, a greater entry than 6, and in few cases has this number been attained.

The Aspatria School is noteworthy in consequence of the directors keeping specially in view the guiding of the education with reference to agricultural pursuits. This school has met with a deserved success, and I believe it to be the only boys' school in Great Britain where agriculture has been made the leading feature.

THE VETERINARY COLLEGES.

Although very much space need not be devoted to these institutions, it will be necessary to notice the principal of them. The most important is the Royal Veterinary College of London, which was founded in 1791, and is the only Veterinary College in England and Wales. Students at this College have to undergo an examination at entrance, unless they have passed one of seven other examinations, which are regarded as equivalent by the College authorities. The fees payable by the students are 1 guinea for their matriculation examination, and 36 guineas for their education. The complete course of study is of three years' duration, and each academical year is divided into two winter terms and one summer term. Students must have passed their eighteenth year before they can present them-

selves for their first examination, their nineteenth before they are eligible for the second, and their twentieth for the third. There are scholarships of 25*l.* per annum, tenable for at least two years by students who have distinguished themselves in the matriculation and subsequent examinations. The number of students who entered the College in the five years from '78 to '82, inclusive, was 294. Of these, 221 passed the matriculation examination, and 73 entered by virtue of examinations previously passed. In the course of the same period, as many as 200 students, or an average of 40 per annum, passed the final examination and obtained the diploma of the College. At this institution, therefore, the education costs 12 guineas a year for three years. Whatever additional cost their education may entail, is defrayed partly by the treatment of horses in the hospital, which has accommodation for about 100 at a time, and partly by the contributions of subscribers.

There are two Veterinary Colleges in Edinburgh and one in Glasgow; namely, at the former city, Dick's Veterinary College and the New Veterinary College; and in the latter, one which is named after its locality. The course of study and the entrance requirements at all these are in conformity with the rules laid down by the Royal College of Veterinary Surgeons, and the fees are about the same, namely, 36 guineas for the complete course. The average number of students attending the Royal (Dick's) College is about 110, that at the New College (a successful private venture of Professor Williams), 124, and that at the Glasgow College from 90 to 115.

THE SCIENCE AND ART DEPARTMENT.

Assistance to instruction in agriculture is given by the English Government through the Science and Art Department in two ways, namely, by the delivery of a course of lectures at the Normal School of Science, and by the encouragement of teachers in elementary schools and science classes by the payment of fees. This is all the State aid which is afforded to agricultural education in Great Britain, with the exception of the endowment before mentioned to the Chair of Agriculture at Edinburgh.

The lectureship in question was only established in the year 1882. The fee for the course of forty lectures is 4*l.*, and for instruction in the laboratory, 10*l.* The course of instruction is given at the Normal School of Science, South Kensington, and it is designed to extend over four years, as follows :—

"First year:—First term, Chemistry; Second term, Mechanics and Mechanical Drawing, with Mathematics and Free-hand Drawing in both terms.

"Second year:—First term, Physics, Part 1, Elements of Astronomy; Second term, Geology, Part 1, including Mineralogy, Mathematics, and Geometrical and Mechanical Drawing throughout both terms.

"Third year:—First term, Biology, Parts 1 and 2; Second term, Ditto, Parts 3 and 4, Mechanics.

"Fourth year:—Principles of Agriculture and Agricultural Chemistry."

It would occupy far too much space to detail here the code of regulations as to agricultural education at the Normal School of Science, or the way in which the promotion of agricultural education has been attempted by the Education Department in elementary schools. Professor Tanner and his coadjutors are very sanguine of success, but it is too early at present to judge of the results.

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

The Royal Charter of Incorporation of this Society contains the following paragraph:—"To take measures for the improvement of the education of those who depend upon the cultivation of the soil for their support." But although it is obvious that a great portion of the work of the Society has been directed towards teaching agriculture by its annual Shows, its trials of implements, and in other similar ways, the object in question remained a dead letter for upwards of a quarter of a century after the establishment of the Society. Mr. J. Chalmers Morton aroused attention on the subject by a speech which he made at a general meeting of members in 1863. This speech was followed by an exhaustive lecture to the members in 1865. Mr. Morton in this lecture attempted to show what the Society could do towards carrying into effect the object already mentioned in the charter. The early attempts of the Council of the Society were not very fruitful in results. They first offered a prize of 50*l.* for an essay on agricultural education, and three essays which competed for this prize were published in the Society's Journal for 1866. Next they offered to candidates who shall be recommended by any member of the Society, and who must be persons in some way dependent on the cultivation of the land for their support, or intending to make agriculture their profession, the following prizes:—

100*l.* amongst those who shall pass the Cambridge or Oxford senior or junior examinations.

100*l.* to those at the Cambridge and Oxford examinations who having passed the preliminary examination should have distinguished themselves in mathematics, mechanics, chemistry, physics, botany, zoology, and geology.

The objects which the Council hoped to attain were to improve sound general education, and to encourage proficiency in such branches of science as are more immediately applicable to agriculture; but there were considerable differences of opinion upon the subject among the members of the Education Committee. Alternative schemes were proposed by the dissident minority, and finally it was decided that senior and junior scholarships should be offered under certain conditions, which it was soon found were too stringent to be adhered to. For instance, candidates were to be the sons of tenant-farmers or of owners of land not exceeding 500 acres, and occupying their own land.

The senior scholarships were only to be given on condition that the scholar should spend a year with a practical agriculturist to be approved by the committee, or at one of the Agricultural Colleges; and the junior scholarships were subject to somewhat similar conditions. The want of success of this scheme was very striking. In the first year no candidate attempted to obtain the senior scholarship, and only seven contested the junior. In 1867 no examination was held under the auspices of the Society, but immediately after that a new scheme was drafted which, with certain modifications of details, has remained in operation ever since. It will be best to give the scheme as it stands *in toto* :—

“The examinations will be conducted by means of written papers, and by a *vivâ voce* examination, at which any member of the Society may be present.

“Every candidate will be required to satisfy the examiners in the science (Chemistry) and practice of Agriculture and in Book-keeping, and also in one of the two following subjects: Land Surveying and Mechanics as applied to Agriculture.

“The successful candidates will be placed in two classes, and arranged in order of merit.

“Candidates in order to be placed in the first class must satisfy the examiners in both Land Surveying and Mechanics as applied to Agriculture.

“Any candidate may offer himself for examination in one or more of the following subjects, viz.: Botany, Geology, or Anatomy. Any knowledge that he may show of these subjects will be counted to his credit in the general classification, provided that he shall have fulfilled the foregoing conditions, and provided that the knowledge of these subjects does not fall

below the standard fixed as a *minimum* in each of these optional subjects.

"Each candidate obtaining a first-class certificate will thereby become a life member of the Society.

"The following prizes will be awarded to candidates placed in the first class for aggregate merit:—first prize, 25*l.*; second prize, 15*l.*; third prize, 10*l.*; fourth prize, 5*l.*

"Certificates, to be named first- and second-class certificates, will be granted to candidates placed in the first and second class; such certificates will specify the subjects in which the candidates shall have satisfied the examiners."

The full examination, which is of a very searching character, extends over five days. The stumbling-block up to the present time, with many otherwise promising candidates, has frequently been the subject of book-keeping. Although the honour of holding a first-class certificate after such a thorough examination must be considered a high one, only a very limited number of candidates have at present availed themselves of this examination. The highest number in any one year has been 21, and the lowest number 2.

It is no secret that many members of the Council of the Society have from time to time wished to abandon this examination, considering the result as inadequate, when money spent by the Society in advertising it and in the payment of examiners is taken into account. Hitherto, however, they have given way to their more sanguine colleagues on this point, and, hoping against hope, as it were, the Society still goes on holding these examinations yearly in May.

But yet another attempt has been made by the Society to encourage education in middle-class schools.

"Ten scholarships, of 20*l.* each, are offered, on condition that the scholar remain at school until the end of the summer term in the following year, or spend the ensuing year with a practical agriculturist, to be approved by the Education Committee, or at one of the Agricultural Colleges, or partly at school and partly with a practical agriculturist, or with a land-agent or at an Agricultural College.

"The scholarship for any year will not be paid until after a testimonial as to good conduct and industry be produced, from the head-master of the school, the principal of the College, or the practical farmer or land agent with whom the scholar has complied with the preceding regulation.

"Candidates for the scholarships must be between 14 and 18 years of age.

"Candidates still at school can only be entered for these scholarships by the head-masters of their respective schools.

Other candidates must satisfy the Education Committee of their fitness to compete by sending certificates of education, or of their having passed any examination in connection with the Science and Art Department, or of any University in the United Kingdom.

“Any head-master intending to enter candidates for these scholarships, and any candidate intending to enter himself, must inform the Secretary of the Royal Agricultural Society of his intention to do so, on or before the first of October in each year. All entries must be made on or before October 15th, and these final entries must give the Christian and surname, as well as the date of birth, of each candidate entered.

“Annual examinations will be held in the month of November, simultaneously at such schools as have candidates, and at the Society’s Rooms in Hanover Square; and the scholarships will be awarded to the boys who obtain the highest aggregate number of marks.

“The subjects for examination for the scholarships will be:— (1) Land surveying; (2) Elementary Mechanics as applied to Agriculture; (3) Chemistry as applied to Agriculture; (4) the Principles of Agriculture, especially with reference to the rotation of crops, the nutrition of plants and animals, and the mechanical cultivation of the soil.”

During the time that these examinations have been in force, that is to say since 1874, the number of candidates has been pretty uniform in each year. The *maximum* number has been 40, and the *minimum* 22. In no case have more than six schools competed, and in two years all the ten scholarships have been awarded. Singularly, in both these cases, an eleventh candidate would have passed had not the number of scholarships been limited.

Veterinary Grants.—Until very recently a subscription of 200*l.* was annually voted by the Council of the Society to the Royal Veterinary College towards the establishment and maintenance of a Chair of Cattle Pathology; but of late years the Society has endeavoured by the offer of medals and money prizes, awarded after a special examination, to induce veterinary surgeons, soon after taking their degree, to turn their special attention to the treatment of the diseases of cattle, sheep, and pigs. It is considered that, as by far the most lucrative part of a veterinary surgeon’s practice is that connected with horses, the diseases of the other animals of the farm are very liable to be neglected by him, especially as the farmer has the ready remedy of the knife, which is applicable in many cases of the sort.

The first prize offered by the Society is a gold medal and 20*l.*, the second prize a silver medal and 10*l.*, and the third prize a

bronze medal and 5l. The examinations are carried out under the auspices of the Royal College of Veterinary Surgeons, and are partly written, partly *vivâ voce*, and partly practical; and the subjects of examination are confined to the pathology, causes, symptoms, and treatment of diseases affecting the above-named farm animals. The number of candidates has not been large, no more than four have presented themselves in any one year, so that it must be confessed that in this direction also the Society has not met with the success it deserves.*

Considerable sums have often been spent from time to time by the Society for the purpose of enabling important researches to be made as to the means of communication, prevention, and cure of various diseases which affect the live-stock of the farm. Extensive investigations have been carried out with regard to cattle plague, pleuro-pneumonia, anthrax, foot-and-mouth disease, fluke in sheep, and other scourges. Several hundred pounds per annum have sometimes been spent in this way, partly through the agency of the Royal Veterinary College, partly through that of the Brown Institution, and partly by means of individual research, and these investigations have had a distinctly educational result.

By many other means the Society has endeavoured to further agricultural education; for instance, the Woburn experiments, which, by the munificence of the Duke of Bedford, K.G., have been conducted upon a continuous plan for some years, may be said to have afforded opportunities to the British farmer of acquainting himself with the value of various foods and manures. The economic value of certain feeding-stuffs, and the comparative economic value of phosphates in different states have from time to time received special elucidation upon this farm. The results of all these experiments are from time to time published in the 'Journal' of the Society, and the farm is open to members or their friends who may wish to see the experiments in progress.

In the matter of examination of foods, manures, seeds, and in certain entomological privileges, the Society has emulated the "*Stations*" of foreign countries which were alluded to in the former part of this Report. Members have the privilege of sending samples of these foods, manures, and seeds for examination by the officers of the Society at exceedingly small fees, and latterly Miss E. A. Ormerod has undertaken the entomological department.

* Since Mr. Jenkins's report was written, this scheme has been modified. Medals are now awarded at the annual Degree Examination to the two successful candidates who obtain the greatest number of marks in the subject of Cattle Pathology.—EDIT.

By farm prizes offered every year in connection with the Shows of the Society, the Society endeavours to stimulate agriculture. The Reports of the Judges, which are published in the 'Journal,' are read with much interest, not only by the competitors and their neighbours, but also by agriculturists in other parts of the country, and thus a mass of information is diffused which must have a good effect upon agriculture.

THE INSTITUTION OF SURVEYORS.

The Institution of Surveyors, which was only established in 1868, and incorporated by Royal Charter in 1881, is authorized to hold examinations to test the qualifications of persons who desire to be recognized as professional members or associates of the Institution. "Students" must first pass a preliminary examination in various subjects unless they have matriculated at any University in the United Kingdom, or have passed the senior local examination of Oxford or Cambridge with honours. There are then two grades of examinations to be passed, namely, one to qualify them as "professional associates," and the second as "fellows." For an associate's diploma the examination has reference not merely to agriculture in the sense of farming, but also to its adjuncts, such as construction of farm-buildings, forestry, land-drainage, geology and composition of soils, book-keeping, the principles of valuation, and the law of landlord and tenant.

The examination is a comparatively new feature of the Institution, but it is understood to have already brought up a fair number of candidates, several of whom come from the Agricultural Colleges of Cirencester and Downton.

HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND.

In addition to the establishment of the Chair of Agriculture at the University of Edinburgh, already described, the Highland and Agricultural Society holds its own examinations in agriculture every year. The examinations are both written and oral, and are very similar in character to those of the Royal Agricultural Society. In order to pass the diploma examination of the Society a candidate must possess a thorough knowledge of the science and practice of agriculture, botany, chemistry, natural history, veterinary science, field engineering, and book-keeping.

The diploma carries with it the life-membership of the Society, but no money prizes are offered as further inducements to candidates to enter for this examination.

It has already been mentioned that the Society grants annually

ten bursaries of 20*l.* each, and five of 10*l.* each, to be competed for by pupils of schools to be approved of by the directors. The 20*l.* bursaries are tenable for one year at the University of Edinburgh, and the 10*l.* ones are tenable for the same period at the schools at which the candidates are being educated.

A sum of 50*l.* a year is also placed by the Society at the disposal of the directors for the purpose of furthering instruction in veterinary science, and field experiments in various parts of Scotland have been from time to time carried out by agriculturists on their own farms at the instance of the Society.

ROTHAMSTED.

It would be impossible to condense into a small space any record of the agricultural experiments begun at Rothamsted by Mr. Lawes (now Sir John Bennet Lawes, Bart.) nearly fifty years ago.

"If all the other experimental stations in the world were put together, and if all the results from them were collected on a book-shelf, in my opinion they would be many times eclipsed by Rothamsted and its records."

Mr. Lawes first commenced experiments with different manuring substances in pots, and afterwards in the field at Rothamsted in 1834. The results obtained were such as to lead to more extensive trials, and in 1843 very systematic field experiments were commenced. The foundation of the Rothamsted experimental station may be said to date from that time. In 1854-5 a new laboratory was built by a public subscription of agriculturists and presented to Mr. Lawes, since which time Dr. J. H. Gilbert, who has been associated with Mr. Lawes since the establishment of the experiments, has had its direction. The staff during the last twenty-five years has consisted of one or two, and sometimes three chemists; two or three general assistants; a botanical assistant, with from three to six boys under him; two or three computers and record-keepers; one, and sometimes two, laboratory men; and much extra occasional assistance is obtained which cannot be enumerated.

The general scope and plan of the field experiments has been to grow some of the most important crops of rotation, each separately, year after year for many years in succession on the same land, without manure, with farmyard-manure, and with a great variety of chemical manures, the same description of manure being, as a rule, applied year after year on the same plot. Experiments on an actual course of rotation with manure, and with different manures, have also been made.

The full record of these most important experiments has

appeared from time to time in the pages of this 'Journal.' In addition, there have been experiments on the mixed herbage of permanent grass-land, investigations as to soils, as to rainfall, and the determination of the composition of drainage-water, which have been of immense importance in elucidating the waste of nitrates in the soil, &c.

Moreover, experiments with the animals of the farm have often been carried out at Rothamsted, and the following points have been investigated:—

"(1.) The amount of its food and of its several constituents consumed in relation to a given live-weight of animal within a given time.

"(2.) The amount of food and of its several constituents consumed to produce a given amount of increase of live-weight.

"(3.) The proportion and relative development of the different organs or parts of different animals.

"(4.) The proximate and ultimate composition of the animals in different conditions, as to age and fatness, and the probable composition of their increase in live-weight during the fattening process.

"(5.) The composition of the solid and liquid excreta in relation to that of the food consumed.

"(6.) The loss or expenditure of constituents by respirations and cutaneous exhalations—that is, in the mere sustenance of the living meat- and manure-making machine."

IRELAND.

Whilst in Great Britain so little has been done for agricultural education by the State, in the sister-country it may be said that almost everything that has been attempted for its advancement has been done under Government supervision and with State assistance. Mr. Pringle's account of Agricultural Education, which was published in the 'Journal' of the Royal Agricultural Society of England in 1873, throws much light on the attempts which have been made from time to time to afford useful instruction to the small farmers, who are characteristic of that country.

In the year 1831 a commencement was made with the present system of National Education in Ireland, and at a very early period in the history of the movement the utility of diffusing among the people correct information upon agriculture was recognized. At first the efforts of the Commissioners were confined to the establishment at Glasnevin, near Dublin, of a

school of agriculture connected with a small farm. Some account of this school will appear later on. Two classes of persons received instruction. First, the schoolmasters, who qualified themselves to teach agriculture in their several districts; and, secondly, a number of young men who were received as agricultural boarders and trained as professional agriculturists.

The Royal Commission, known as the Devon Commission, which issued its Report in 1843, spoke in very favourable terms of the advantages of this school, which had then been established about five years. Subsequently, on the establishment of the Royal Agricultural Improvement Society of Ireland, recommendations were issued in its journal to the effect that every National school in Ireland should become an agricultural school, if situated in a rural district. Every schoolmaster in Ireland should be impressed with and inculcate the one idea, that the gangrene of Irish society is absence of practical principles. The original idea of the Educational Commissioners seems, therefore, to blend agricultural with literary instruction in as many of the rural National schools as possible. But applications for schools of a superior class to these were soon made to the Commissioners, and a number of model agricultural schools were established, solely at the public expense, in various parts of the country under their auspices.

In 1873, there were in operation throughout Ireland seventeen of these model schools, exclusive of the Albert Institution at Glasnevin. The original idea of blending agricultural with literary instruction in ordinary rural National schools lost way as the agricultural schools proper succeeded. It was not, however, entirely abandoned, though the number of schools went down to 39 in 1861; but in 1873 there were in operation 115 of these schools; the total cost to the State for the agricultural instruction afforded in them was 5*l.* per school. The total number of boys who received this agricultural education was about 4200.

At the instance of Lord Spencer a very long minute or letter, by Sir Patrick Keenan, K.C.M.G., C.B., resident Commissioner of National Education, appears in Mr. Jenkins's Report.

It commences with an historical sketch of the efforts which have been made to promote agricultural education in Ireland. Passing over his notice of Templemoyle School, in the county Londonderry, of which some notice will be given later on, I may notice that lectures upon agriculture were given to the students of the normal school at Dublin as early as 1838. Afterwards the Glasnevin School and farm were established, and Sir Patrick Keenan points out that the function of Templemoyle

was exclusively to produce skilled farmers, whilst that of Glasnevin was *mainly* to qualify elementary teachers to instruct the pupils of rural schools in the principles of agricultural science.

In 1848 the Lord-Lieutenant, Lord Clarendon, appointed a body of agriculturists, called Practical Instructors, to go about amongst the farmers, especially in the districts which had been ravaged by the famine, to urge them to improve their system of cropping, and to undertake the drainage of their farms. Sir P. Keenan thinks that no more fruitful experiment than this was ever attempted in the material interests of the country.

The establishment of model schools by the Commissioners in different parts of the country cost no less than 115,000*l.*, and for some time they all enjoyed an immense popularity. But an agitation, originated by the Liverpool Financial Reform Association about a quarter of a century ago, arose against the whole agricultural system. This association disputed the right of the State to train up farmers and stewards at the public cost, and owing to the great hostility which was manifested in Parliament to the system, the Royal Commission upon Primary Education in 1870 recommended that the position of provincial and district model agricultural schools should be revised by the Commissioners of National Education, and that their number should be reduced.

In 1872, during Lord Spencer's first Lord-Lieutenancy, his Excellency directed his attention to a considerable extent to the farming of the country. He devised a scheme of prizes, and proposed to give annually for five years three prizes, to be called the "Spencer small farm prizes," to the occupiers of the three holdings in certain districts, which should be adjudged to be the most commendable on the score of neatness, cleanliness, stocking, &c. The Education Commissioners received this scheme with much satisfaction, and in each of the five years of the experiment the Commissioners received a report from their inspectors, which satisfied them that the scheme had proved to be a great success.

In 1874 a committee was appointed by the Treasury to investigate the affairs of the National Board of Education. The Agricultural Branch of the National system naturally came under their survey, and they reported that, exclusive of Glasnevin, there were in the other twenty agricultural schools but thirty-three resident pupils. The committee recommended, therefore, that these farms which had been established at such great expense should be got rid of as speedily as possible. In a short time nine of these farms were sold, seven were surrendered to the landlords, one relet, and two handed over to local

management. At the present time there are thus left in Ireland only two schools, which are supported by the State, namely, the Munster Farm at Cork, and the Albert Institution, Glasnevin. The case of the Munster Farm is interesting. Just as the Commissioners were taking steps to get rid of it, a movement was set on foot in Cork to reanimate it, and an appeal made to the Treasury to allow its object to be made the improvement of butter-making.

Luckily this appeal gained the Treasury sanction, but the local committee had to advance considerable sums in augmentation of the parliamentary grant. Some account of the school will appear later on, but it may be mentioned here that the experiment so far has been eminently successful.

The training of teachers in the Normal School at Dublin has been carried on from year to year, and about 100 male students get sound practical instruction every year upon the Glasnevin Farm during the period of their training.

TEMPLEMOYLE SEMINARY.

The first school, of which it would be desirable to give a few details, is the oldest institution of the kind in Ireland, namely, that of Templemoyle, about six miles from Derry. It was organized on the plan of a school in Switzerland, and the necessary funds were obtained by the issue of shares. The Grocers' Company, who had subscribed about 1200*l.* towards the establishment of the school, let the committee about 169 Imperial acres of land for the small sum of 30*l.* per annum. Like some other Institutions, the history of which has been chronicled in these pages, the school was by no means a financial success in its early days. The fees charged were only 10*l.* a-year, for which the pupils received a theoretical and practical instruction on the half-time principle, that is to say, that one-half of their time was devoted to actual work on the farm. The boys were divided into two equal divisions, A and B. On a given day division A commenced work in the morning and B went to school, and so on alternately.

The head-farmer had full directions given him by the committee as to the manual labour which the boys were to perform upon the farm, and he delivered evening lectures to the pupils on the theory and practice of agriculture.

In the course of twenty-three years this school educated as many as 800 pupils, and its career must be regarded as eminently successful in accomplishing the objects for which it was founded. That it was unsuccessful financially, and therefore ceased to exist some years ago, is much to be regretted.

THE ALBERT INSTITUTION, GLASNEVIN.

This Institution is designed to supply instruction in the science and practice of agriculture to the sons of farmers, agricultural teachers, and others.

The farm contains about 180 statute acres. About 6 acres is cultivated as a small spade-labour farm; about 23 acres is set apart to illustrate the system of farm management, where one or two horses are kept; the remaining portion forms the "large farm."

Arrangements are made for affording the students as large an amount of information as possible upon every branch of the business of farming, including dairy husbandry, fattening of cattle, breeding and rearing of stock, and the various operations of field culture.

Three classes of students are admitted to the Institution, namely:—(1) Free resident students, who are boarded, lodged, and educated at the public expense, and who are admitted twice a year by competitive examination. (2) Paying resident students, who are admitted on certain conditions as to education, and who pay a fee of 7*l.* 10*s.* per session (there are two terms or sessions of four months each in the year), which payment includes the cost of instruction, board, lodging, washing, and medical attendance; and (3) Non-resident students, who board and lodge at their own expense in the neighbourhood, are amenable to the rules and regulations of the College, and pay in advance a fee of 2*l.* a session.

THE MUNSTER DAIRY SCHOOL.

This Institution, which is within three miles of Cork, was established for the purpose of affording instruction in the science and practice of agriculture to the sons of farmers and others. The school is maintained by a grant from the National Board of Education, supplemented by local subscriptions. There are two main departments of the Institution, viz.:—(1) The instruction and training of the sons of farmers and others in the best modes of developing the resources of the land, and (2) the instruction of the daughters of farmers and of others in improved modes of dairy management. Experiments are, moreover, carried out on the farm attached to the school.

In the agricultural school there are practical demonstrations besides instruction in the science and practice of agriculture, whilst particular attention is paid to dairy husbandry, including the winter feeding of cows for the production of butter. Lectures are given on agriculture, chemistry, geology, veterinary subjects, and natural history; and farm accounts, surveying,

levelling, and mapping are all included in the educational course.

There are two sessions of four months each in the year, and the fees for internal students are 7*l.* 10*s.* per session. External students are also admitted on a payment of 2*l.* per session.

In the dairy department the daughters of farmers and others receive instruction in the nature of food and the feeding of milch cows, and in the nature of milk and its products. There are also practical demonstrations in the most approved modes of handling milk and of making butter, &c. In this department there are two sessions of only six weeks each in the year, and the fee for each session is 3*l.* for internal, 15*s.* for external students.

In both schools the students are examined under the direction of the Commissioners of National Education at the end of each session, and prizes varying in amount from 1*l.* to 3*l.* 10*s.* are given for proficiency in each separate subject. No student, however, can take more than three prizes in any one session.

The Dairy School only commenced operations in August 1880, and the increase in the number of pupils during the next two or three years was very satisfactory. Constant applications are received from noblemen and extensive farmers, asking for the services of a dairymaid who has been instructed in the school. It will not be surprising that the small fees charged at this school have led from time to time to deficiencies, which have been met by subscriptions. Had it not been for the Government subsidy, there can be no question that this very useful institution would ere now have ceased to exist.

THE TRAVELLING EDUCATIONAL DAIRY.

In 1881 an Educational Dairy, the property of the Royal Agricultural Society of Ireland, was started at the instance of that enthusiastic friend of the Irish farmer, the Rev. Canon Bagot. The Travelling Dairy, when closed for a journey, looks more like a large furniture-van than anything else. It is easily drawn by one horse, as its contents are not very heavy. When required for work, the wheels are taken off, the upper halves of the sides are expanded upwards, so as to form eaves to the roof, while the lower halves are let down to form a continuation of the floor; and the result is a covered shed with boarded floor, measuring 12 feet by 10 feet, and furnished with all necessary appliances, and with hot and cold water laid on from an arrangement at the back.

The staff consists of a lecturer, a first-rate dairymaid, and an assistant. In the course of the day there are generally three

churnings and makings-up of butter, and an explanatory lecture is given each time. Questions are asked and answered, and every operation is performed according to the best systems. The dairy and its staff are let out to landowners and other persons willing to hire it, as well as to local agricultural societies. The minimum charge is for a week, and the rate 7*l.* per week, in addition to the travelling expenses by rail.

Examinations have been attempted at the end of the visit of the dairy to particular districts, and the best answers have received a prize of 20*s.*, and the second best 10*s.*, from the Society. At some of the examinations there have been as many as twenty-three candidates, and never less than seven. The cost of the dairy, exclusive of furniture, including hot and cold water fittings, cisterns, boiler, &c., was 115*l.*

MR. JENKINS'S RECOMMENDATIONS.

In the recommendations at the end of his Report, Mr. Jenkins endorses the German and, indeed, the Continental view, that education, as such, can be given quite as effectively through the partial medium of sciences bearing upon agriculture, as through the exclusive medium of pure mathematics and the dead languages, and desires more particularly to express his concurrence with the opinion that facts should be learned before principles. Following this up, he quotes Mr. Lawrence's opinion, given in this 'Journal' many years ago, "that he would recommend any youth resolving upon agriculture as his occupation in life, to place himself with a tenant-farmer for a year, to acquire what may be called the grammar of agriculture. With this preparation he would be in a position to derive greater advantage from a two-years' course of instruction at Cirencester, or any other agricultural college. After this, two years' residence with a skilful farmer, with careful daily observation and the study of the most approved agricultural literature, would form a reasonably safe foundation to work upon."

The system here recommended is practically identical with the Danish system, and comes very near to that which is adopted at the *Institut National Agronomique*; but whether these two divisions of the educational process should be conducted concurrently or in succession, appears to be more a question of opportunity, and especially of time and money, than of necessity.

Mr. Jenkins remarks that English farmers are notably specialists, and thus explains our success in agriculture in this country. There is a danger in attempting too much, and the German system, which covers such an immense ground, is too

far-reaching, and therefore of necessity loses in depth what it seeks to gain in breadth. Mr. Jenkins instances the case of a Frenchman who was quite astonished on being told by an English farmer, of whom he had requested information on the relative merits of certain sheep: "Oh! those are Southdowns, but I am a Cotswold man; if you ask So-and-so, he'll tell you all about them." To this gentleman a sheep was a sheep, no matter to what breed it belonged, and a man who could judge one sheep should, in his opinion, be capable of judging another.

But whilst special knowledge is essential to a success in farming, many foreign agriculturists have a great advantage over us, because their theoretical knowledge enables them in an emergency to adapt their cultivation more easily to altered circumstances.

In criticising the agricultural department of the Normal School of Science at South Kensington, Mr. Jenkins remarks that the four-years' course is too long, and that the subjects bearing upon agriculture, as specified in the syllabus, do not cover a wide enough field. In other words, a diligent student under the present regulations must turn to other subjects or other means of employing his time, unless he spends a large proportion of the intervals between lectures upon a farm near London. He also suggests that means should be adopted to ascertain that students possess a sufficient preliminary knowledge of elementary facts and the language of agriculture. Scholarships to be devoted to the reduction of the annual fees might then be awarded for special proficiency in the technical part of this entrance examination.

Visits should be made to farms such as Rothamsted and Woburn, to agricultural implement works, to artificial manure works, and to other establishments where the pupils could be brought into contact with the facts and phenomena with regard to which they have received instruction, and there should be examinations on these subjects at the end of each term, and the award of special prizes for distinguished proficiency.

Mr. Jenkins also suggests that at least two scholarships of 100*l.* a year each, and each tenable for two years, should be awarded to the student who has passed through the whole course of study, and who has passed his final examination with the greatest credit. This would enable students to pass a year or two upon a farm, which might be beforehand approved for the purpose by the authorities of the Normal School, and the money should not be paid until after a report has been received in each year from the scholar, giving an intelligible account of the operations conducted on the farm during the

year, the nature of the seasons, the consequent vicissitudes of the crops and live-stock, and, in short, a general statement of the farming and its results, showing a due appreciation of modifying causes. Mr. Jenkins says it need not follow that the two years should be passed on the same farm, or even in the same country, provided that the authorities approved beforehand of the action of the scholar.

There can be little doubt that, were this recommendation carried out, there would be, in a short time, a larger number of qualified teachers of agricultural science for schools of different kinds in the kingdom.

Mr. Jenkins thinks that the Agricultural Colleges, properly so called, require no propping from the State. Some may consider that, because the Government grants 150*l.* a-year towards the stipend of a Professor of Agriculture at Edinburgh, and has established a Chair of Agriculture at the Normal School of Science at a cost of 200*l.* per annum, the two Agricultural Colleges are equally entitled to a subsidy; but, as a matter of fact, these latter are frequented by the sons of gentlemen, who can well afford to pay at a remunerative scale, whereas the other institutions aided by Government grants could scarcely exist without them.

With regard to the intermediate agricultural education, Mr. Jenkins quotes at great length the opinions of the Rev. J. J. Merriman, D.D., the head-master of the Surrey County School, at Cranleigh. Dr. Merriman thinks "that much good might be done to future farming, if those destined for tenant-farmers in the future could receive instruction in it before entering upon it as an occupation. Such education could only be given with advantage to youths who had already acquired a fair amount of liberal education, including, of necessity, mathematics and physical science, and at a cost within the reach of tenant-farmers; and where the youths had the opportunity of personally taking part in farming operations, conducted on good methods, such as would make an ordinary farm pay.

"The only plan by which these circumstances could be secured would be to attach to schools a special farming department, in which a number of boys, who had already got near the top of the school, should be carefully taught the principles and practice of farming, and should take part in farming operations on a farm connected with the schools, which should be conducted upon paying principles, and not as a mere experimental farm."

The cost of all this is of vital importance. Considerable capital would be necessary for stocking the farm, &c. None of the schools to which a farm would be likely to be attached would be rich enough to find this capital. Dr. Merriman, therefore,

suggests that an appeal should be made to those interested in agriculture to provide the necessary money.

The principle of the whole matter he considers is that farming should be taught on a farm that pays, and not on a losing concern; and with sufficient proof of the fact that it was a paying concern, perhaps there would be no difficulty in raising the money.

In his remarks on lower agricultural education—that is to say, the education of farm-labourers, farm-bailiffs, and peasant proprietors—Mr. Jenkins observes that there is no greater want in English agriculture at the present time than thoroughly reliable and intelligent farm-bailiffs. Whilst landowners abroad find no difficulty in cultivating several thousand acres of their own land, in England a landlord who has a few hundred acres of land thrown upon his own hands is invariably heard to complain that he is able to obtain neither rent nor interest of money for the same.

At the present time there exists no machinery in Great Britain for the technical instruction of this class except that given by the science teachers under the Science and Art Department. Most of the youths, who are sons of small farmers and of farm-bailiffs, obtain their general education at a public elementary school or at a cheap private school. The difficulties of the subject are these, that a small farmer or a farm-bailiff would not be willing to keep his son at school longer than he was obliged, unless he could see clearly that it would be to the boy's advantage. But if he thought he could start him in life with a fair prospect of making a good living as a farm-bailiff, he would probably be willing to do so.

Mr. Jenkins, therefore, borrows an idea from the French system of farm-schools, and suggests that in each county a good farm should be selected, the tenant of which would agree, under certain terms, to take agricultural apprentices for two or three years; that a teacher capable of continuing the general education of the apprentices by lessons given in the mornings and evenings should be attached to each farm, and that a portion of the farm labour should be performed by the apprentices. The selection of apprentices should be made under an examination held annually with the Science and Art Department. During their stay at the farm-school the apprentices should be compelled to pass an annual examination in practical as well as theoretical subjects. Prizes should be given for proficiency, and apprentices found deficient should be removed.

Mr. Jenkins thinks that if "Agriculture" were placed by the Government upon the same footing with "Science and Art," and such educational farms were subsidised by the State, that

there is no reason why they should not be made a success. At present the Munster Dairy School costs the Government 1000*l.* a year, and a few more sums of this kind would induce farmers to take farm apprentices upon terms that would fairly reimburse them.

As an instance of the way in which useful knowledge in elementary schools may be imparted, it is only necessary to mention Miss Ormerod's illustrations of injurious farm-insects, which were prepared some short time since for the Royal Agricultural Society. These illustrations have been drawn from life on a large scale by Miss Ormerod, and managers of schools who are desirous to give the children the opportunity of learning all about the habits of destructive insects would do well to place these admirable figures on their school walls.

Among the recommendations of the Commissioners themselves which relate to agriculture, we only find the following which have a practical bearing on the subject:—

- "1. That the great national agricultural societies should give aid to the establishment in counties of secondary schools or classes for teaching agriculture, and that some of the funds hitherto devoted mainly to the encouragement of premiums for cattle and machinery should be diverted to this object.
- "2. That those responsible for the management of primary schools in Ireland in the districts where farming is defective should attach small example farms to such schools wherever it is possible, and that Boards of Guardians employ the plots of land attached to work-houses for the agricultural instruction of the children therein."

Generally, the Commissioners agree with Mr. Jenkins's conclusions and recommendations; but whilst they consider agricultural education of national interest in Great Britain, they look upon it as a matter of life and death in Ireland. They, therefore, would gladly see the successful experiment of the Cork Dairy School, for instance, repeated in other parts of Ireland, each such school being established by local effort and conducted in accordance with the wants of the locality, and they recommend that in such cases the Treasury should encourage and aid such schools by grants out of Imperial funds.

**XXIII.—Report on the Farm-Prize Competition of 1885.—
CLASSES I. and II. By JAMES EDWARDS, Woodhorn,
Morpeth.**

Judges.

GARRETT TAYLOR, Trowse House, Norwich.
TEASDALE H. HUTCHINSON, Manor House, Catterick.
JAMES EDWARDS, Woodhorn Manor, Morpeth.

IN writing a Report of this kind, it is advisable, if not necessary, in the first place to notice the general features of soil, climate, and market, which in all cases more or less influence the farmer in deciding upon the class of farming to adopt, and the particular produce which will pay him best to grow. Agricultural writers do not, as a rule, lead us to suppose that farming is seen to the best advantage in the great manufacturing districts, and it may be freely admitted that in many respects this is correct. In such districts, amongst which Preston, with its neighbouring large centres of manufacturing industry, may well be classed, farming is a less complete and self-contained industry than in purely agricultural counties. It is as a rule more prosaic, less picturesque. Rents and rates are often high, so also is labour. It will not pay to grow anything except what is wanted by these neighbouring large towns; and the fact appears to be readily grasped by Lancashire farmers that it is in supplying either the more perishable dairy produce, or such bulky produce as hay, grass, roots, potatoes, straw, &c., that they can the more readily defy competition of brother farmers at a distance, who can deliver only by rail instead of by road.

Farmers in rural districts are no doubt right in adopting the old-fashioned principle of putting their eggs in more than one basket, otherwise called mixed husbandry. But it is certainly none the less true that farmers in populous districts are equally justified in devoting themselves to the production of those specialities for which they have the readiest market; and, viewed in this light, I venture to think there are few farmers, from the Lothians to the Cotswolds, who would not find a lesson to learn on visiting some of the best instances in Lancashire of this special style of farming, say Mr. Ashton's, or Mr. Cropper's, the first-prize farms in Classes I. and II. respectively, where every opportunity is turned to the best account, and no advantage neglected, than which no man can do more.

I have dwelt somewhat on this comparison of systems of farming, in order that my readers may follow, and I hope

endorse, the principle which, to some extent and in certain cases, influenced the Judges to condemn farm practices which appeared to them a departure from the line indicated, as being, under all the circumstances, the most profitable and desirable to pursue. Such were the consumption of hay and treading down of straw by stock, when, in their opinion, both the hay and straw might have been sold and a greater value of manure brought back on to the farm, to the advantage of the tenant's pocket and with greater benefit to the farm, and also without any of the risks of disease or accident involved by the alternative system. This may appear at first sight a reversal of the usually accepted theories as to sale of produce; but, taken in conjunction with the fact of the great facility with which manure can be loaded back from the town, the keeping of a large head of live-stock suffers by comparison; though, doubtless, it will still remain in the future as in the past, the safeguard and sheet-anchor of the ordinarily situated farmer.

Probably few counties could compare with Lancashire in the rapidity with which her trade and population have developed themselves in the last century, especially as regards the increase of population to the square mile; and as this subject has a tolerably direct connection with the system of farming which has been thereby induced, a few figures on the point may be of interest. In 'Lectures on the Industrial Revolution in England,' by Arnold Toynbee, it is stated that between the years 1700 and 1750 the population of Lancashire increased from 166,200 to 297,400, or 78 per cent.; and the same author further states, that whereas in 1700 Lancashire was not one of the twelve most densely populated counties in England to the square mile, in 1750 it stood fifth largest on the list with 156, and in 1881 it stood third largest on the list of twelve counties with a population of 1813 to the square mile,—an increase for the last thirty-one years nearly double that of Middlesex per square mile in the same length of time.

That portion of Lancashire which exhibits the best and most enterprising farming is, roughly speaking, a belt of some ten or fifteen miles in width, which is continuous with the coast from Fleetwood on the north, to Liverpool on the south side, where, however, it becomes very narrow, and thence follows the north side of the Mersey to Manchester. This belt is composed of New Red Sandstone, and the greater portion of the competing farms are situated upon it. The soil, however, in some cases, especially in the neighbourhood of Lytham and Southport, does not exhibit the red colour or gravelly clay texture which is a common feature of this formation in the Midland counties, but is here a black peat moss, resting on sand, and affording a deep

free working soil of moderate natural fertility. In the neighbourhood of Liverpool the soil is more characteristic of the formation from which it is derived ; and in Cheshire, at Ashley Hall and also at Chelford, the soil on the same formation is light sandy loam of good texture. With the farms on the Chester and Welsh side of the district within which the Society's premiums were offered, we need not now concern ourselves, as they do not appear in this Report, though they also were mostly on this same formation.

Lancashire enjoys the unenviable distinction of being one of those North-Western counties in which the largest rainfall is registered annually ; Westmoreland, the adjoining county, I believe, having the largest of all ; the three together, viz., Cumberland, Westmoreland, and Lancashire, averaging something like from two to three times the depth of rain which falls in some of the Eastern counties. This moist climate no doubt favours the growth of grass, which forms such a very extensive and important proportion of the leading farms with which we here have to do ; but how far it favours the making of grass into hay is doubtful. There is no room for doubt, however, that it has been made into the very best of hay this year, without so much credit to the farmer as to the magnificent hay weather which came to his aid. And the same is true of last year also, as the stacks still standing gave abundant evidence ; and I should be inclined to think that hard work and skilful management, such as we saw brought to bear upon the hay harvest of this season, will, in the majority of years, avert the serious loss and damage which are so often the result of carelessness and want of energy in the process of hay-making.

But if the worst comes to the worst, let the weather be ever so bad, the farmer whose occupation is within carting distance of Liverpool has, in delivering his grass green, a very useful alternative, and one of which he often avails himself. I will not go into the abstruse question as to whether he ought or ought not to adopt the third alternative, and make silage ; but he certainly will not be likely to do so, at any rate until silage has a recognised place and price quotation on the Liverpool market, which I hardly think is the case at present ; and in the meantime, selling grass at a pound a ton is a fairly good ready-money business as times go.

The moist climate, together with a porous soil, is also favourable to the cultivation of potatoes, which is quite one of the most important crops, and probably the most valuable one that is grown in this district ; and this season the potato crop appeared to be more uniformly good than any other, and should turn out of excellent quality.

The county roads also must be considerably improved since the days when Arthur Young wrote to the effect that it took a week or more for a coach to go from London to Edinburgh, and stated that "On that infernal road between Preston and Wigan, the ruts were four feet deep! and he saw three carts break down in a mile of road." On the whole, the roads must now, I think, be considered good, so far as we were able to judge in the course of our travels, which sometimes necessitated our driving thirty or forty miles a day. Not, however, that we enjoyed driving on the roads paved with cobble stones, common in some of the peat-bog districts, and which gave, in driving over them, the same peculiar sensation of vibration as a galvanic battery; but it is quite possible that it is the best and only durable road across a peat bog, where there is no available road metal, and where, if it existed, there is no foundation on which to lay it.

For markets in Lancashire there is no lack; they are capable indeed of affording a ready sale for all the produce (of the class before alluded to) that every acre within a certain radius is capable of growing. Consequently, those farmers who study to supply what is wanted, run very little risk of not being able to sell it at a fair price. In the sale of wheat, perhaps they are not better off than other people; and they may be familiar with the stern outspoken reproof of the miller or corn merchant, who, on looking at your sample of good sound English wheat, and hearing you name your modest price, only replies by showing you a handful of foreign, dry as shot, and of a colour which is certainly all the better, because it has never experienced a shower of rain. On hearing the price of this wheat you feel there is nothing more to be said; the spirit of repartee is crushed within you, you go away sorrowful. But this is not quite so serious a matter in what may be called "suburban" farming as in a case where the corn has to pay the rent, and something more besides, and there is little else to fall back upon; in such a case what is a farmer to do when he is told "that there happens to be an over-production of wheat of a much better quality than his own, throughout the world"? Try something else, is good advice, but not always easy to follow.

At any rate, most of the farmers with whom the Judges had to do have as many strings to their bow as most people, and make as good use of them too. Messrs. Sherwin and Callwood are less within the vortex of the Manchester and Liverpool markets than the other competitors noticed in this Report, and they therefore adopt a more general style of farming; still even they are considerably influenced by the Manchester market,

distant some ten or twelve miles in the case of Mr. Sherwin, and some eighteen or twenty in that of Mr. Callwood.

On November the 17th, 1884, the Judges appointed by the Society to act in the Farm Competition met by appointment at Preston, and there received the entries, maps of the district, on which the locality of each farm was marked, and also general instructions as to the most advisable routes to follow, &c., from the Secretary, Mr. H. M. Jenkins; and thus equipped, commenced their first round of visits on the following day; and though the writer of this Report was summoned to London by telegraph the same night, to what proved to be the deathbed of a very near relative,—and was consequently prevented from being present on the first round of inspection,—through the kindness of his colleagues in allowing him the use of their notes, he is enabled to give information on points of management and certain details, which were noted by them on that occasion.

The entry form received by each competitor contains, amongst other information, describing the terms of the competition, the following, which I think it best to insert here for the convenience of my readers, some of whom may not have had access to the form I allude to:—

“The Judges will be instructed especially to consider—

- “ 1. General management with a view to profit.
- “ 2. Productiveness of crops.
- “ 3. Quality and suitability of live-stock.
- “ 4. Management of grass land.
- “ 5. State of gates, fences, roads, and general neatness.
- “ 6. Mode of book-keeping followed (if any).
- “ 7. Management of the dairy and dairy produce, if dairying is pursued.”

And though it may fairly be admitted that if all these seven points are satisfactorily carried out, they embrace every object which it is desirable to bring about on any farm, still it was for the Judges to mentally couple “cleanliness” with productiveness in Point 2, and to include the management and suitability of implements and machinery in Point 5. The Judges were also very properly instructed “to take into consideration any special advantage that one competitor might have over another.”

The second round of inspection commenced on Friday, April 17th, 1885, and the third round on July 8th, this being the final one. These three visits are necessary, in order to follow the management of each individual farm from cause to effect, the effect or result being seen on the summer round of inspection in the crops, some secured, and others nearly at

maturity. The cause being seen in the autumn and spring visits, beginning with the first stirring of the soil after harvest (very properly looked upon as the agricultural New Year), and in April the cultivation for roots and treatment of growing crops, setting potatoes, &c.—this latter a very large item on most of the farms on our list, so far as the crops are concerned. As regards the live-stock in the first November visit, to notice the cause or management in the housing and feeding and care-taking, which produces the effect in spring of a goodly show of well-fed beef perhaps, where that is the object in view ; or, it may be, a turn out on to grass of a lot of strong, thriving, growing, young cattle. Or a dairy of cows,—not half starved, and requiring a good part of the summer to regain condition, lost perhaps during the winter,—and not injudiciously over-fed, an almost greater and more dangerous evil than the other, especially in the case of pregnant animals, but cows in sound vigorous habit of body, with the bloom of health on their skins, the result of airy sheds to lie in, exercise in the middle of the day, good sound provender, and pure water. It is the man who thus brings his cows through the winter who has a right to hopefully anticipate a fall of strong good calves, and to expect that every blade of grass will be turned into money. And so in the winter management of all other kinds of farm stock, to see that it was such as would ensure, as far as may be, the horses being in condition for the pushing on of spring work, and the ewes for lambing and rearing their lambs, though, to tell the truth, only I think on one or two farms was there a ewe flock kept, and scarcely any of the leading men in either class owned a sheep, showing that the Judges concurred in their absence.

To those gentlemen who have on this occasion been unsuccessful, I will only say, what I am sure my fellow Judges will endorse, that on their farms we saw many instances of excellent farming, such as on a future similar occasion may take a great deal of beating ; and I am also sure that my colleagues and myself would gladly congratulate them on any such future success, wishing them for the present, “better luck next time.” It is with great pleasure we wish to record here, the universal courtesy, hospitality, and assistance in giving information, which we received from every competitor, and to offer our sincere thanks to themselves and their families.

I will now, without further introduction, append a list of the competitors, and proceed to describe the prize and commended farms in each class.

TABLE I.—List of Competitors for the Farm-Prizes offered in connection with the Preston Meeting, 1885.
 Class I. For the best managed Arable Farm of 100 acres and upwards in extent, with at least two-thirds of its area under rotation of cropping.
 Class II. For the best managed Arable Farm above 30 and under 100 acres, under the same conditions.

NAME.	ADDRESS.	Acreage.			NATURE OF SOIL AND SUBSOIL.	REMARKS.	AWARD.
CLASS I.							
Ashton, W. Gore ..	Roby Farm, Liverpool ..	A. 166	B. 0	P. 0	{Heavy; a small portion Light. Mixture—Marl, Sand, and Gravel .. .. .	.. ..	First Prize, £50.
Callwood, James ..	Chelford, Crewe	153	0	0	Light. Sandy .. .. .	.. ..	Special Prize.
Cook, John	Linacre, Bootle, Liverpool ..	200	0	0	Light. Sandy, with Clay under .. .. .	.. ..	.. ..
Gibbons, John and Edward.. .. .	{Bickersstaffe Hall, Ormskirk	400	0	0	Light. Sandy and Clay .. .. .	.. ..	.. ..
Griffiths, James ..	{Rake Farm, Hawarden, Cheshire	670	0	0	Heavy. Nearly all Clay	{*370 acres not for competition .. .. .	.. ..
Johnson, William ..	{Hale Gate Farm, Halebank, Widnes	242	0	0	Heavy (very little Soil on some parts). Clay	{+166 acres not for competition, and 1000 acres sheep-walk ..	.. ..
Kellett, William ..	Plas Newydd, Ruthin ..	350	0	0	Medium. Clay and Sand .. .. .	.. ..	.. ..
Kirkham, Henry ..	Peel, Lytham	173	0	0	Light. Chiefly Clay, but part Peat .. .. .	.. ..	.. ..
Middlehurst, James ..	{Berry House, Scarisbrick, Ormskirk	213	0	0	Light. Variable; different sorts of Bog, Sand, and Clay .. .. .	.. ..	.. ..
Muaker, Robert ..	{Stand Park, Aintree, Seaford	242	3	10	Light. Sandy .. .. .	.. ..	.. ..
Roberts, John	{Geinas Farm, Bodfari, Rhyl	176	1	79	{Light, and part Heavy. Gravelly, Sandy, and part Heavy Loam .. .. .	.. ..	.. ..
Roebottom, Samuel ..	{Stanley Farm, Bickersstaffe, Ormskirk	108	1	17	Light Black Soil. Sandy .. .. .	.. ..	.. ..
Scotton, William ..	Mossley Hill, Liverpool ..	302	0	0	Mostly Light. Red Sandstone and Clay chiefly .. .. .	.. ..	Highly Commended.
Sherwin, Charles ..	Ashley Hall, Altrincham ..	229	2	1	Mixed. Variable .. .. .	.. ..	Second Prize, £25.
Turton, William ..	{Burnt Mill Farm, Hale, Liverpool	115	3	16	Heavy. Clay .. .. .	.. ..	Highly Commended.
Wright, Mark.. ..	{Gill Moss Farm, Croxteth Park, Liverpool	222	0	0	Light and Heavy. Clay and Sand .. .. .	.. ..	Commended.
CLASS II.							
Ainscough, Hugh ..	Banks, Southport	52	2	0	Light. Peaty Moss .. .. .	.. ..	Highly Commended.
Bell, Thomas	{Guinea Hall, Banks, Southport	65	2	6	Light Loam, Moss and Marl .. .. .	.. ..	.. ..
Brade, Richard	Banks, Southport	90	2	8	Light. Peaty Moss and Marl .. .. .	.. ..	Second Prize, £15.
Cartmell, Elizabeth ..	{North Farm, Moss-side, Lytham	71	0	0	Light and Heavy. Peat and Clay .. .. .	.. ..	.. ..
Cropper, John.. ..	{Moss-side, Maghull, Liverpool	140	0	0	Light. Sand; some parts little Clay	{192 acres not for competition	First Prize, £30.
Stockton, Richard ..	Ashley, Altrincham ..	61	0	0	.. .. .	.. ..	.. ..
Whalley, John	Reasnov, St. Helens ..	94	0	0	Light. Chiefly Sand, and running to Moss	{Including garden	Highly Commended.

CLASS I.—FIRST PRIZE, £50.

Mr. W. Gore Ashton, Roby Farm, Liverpool.

Arable	..	..	..	160	acres.
Grass	..	..	..	6	„
Total	..	..	..	166	„

This farm, the property of the Earl of Derby, is hired from year to year, with no restrictions as to either cropping or sale of produce. Rent and tithe, 391*l*.

The present tenant has occupied this farm for thirty-six years, and succeeded his father, so it may be presumed that there is a good understanding existing between owner and occupier. The system of farming adopted by Mr. Ashton sounds simple in the extreme; it consists of selling at Liverpool everything which the farm produces, and loading back with manure, principally from stables using sawdust-bedding, but also from cattle sheds and latrines. The only exceptions to the carrying out of this system to the letter being in the case of autumn aftermath, which is let to cattle salesmen for grazing purposes, and realises about 60*l*. a year, and also the produce of six acres of permanent pasture used for the grazing of stock.

Mr. Ashton's farm is mostly heavy; a small portion is peat moss, and the remainder light land, consisting of a mixture of marl, sand, and gravel. Upon the farm there is a very large excavation from which marl has been carted and mixed with lime, at the rate of about 1 load of lime to 5 of marl; and a large portion of the land has received a dressing of this compost, at the rate of about 25 tons per acre. For this special operation Mr. Ashton has, on three occasions, received the prize given by the principal local Agricultural Societies.

In the field of Farm Prize Competition Mr. Ashton is no novice. Since the year 1850 I was informed that he had received from the Royal Manchester, Liverpool, and North Lancashire Agricultural Society, no less than five prizes for the best-cultivated farm. These, together with the first prize this year of the Royal Agricultural Society of England, offered by his own landlord, the Earl of Derby, must fairly entitle him to be looked upon as a veteran who has fought and won many a well-earned victory, though happily in a bloodless battle-field. And in truth Mr. Ashton, though not so young as he was, looks like proving an awkward antagonist for many a long year to come, in any similar contest. And if the secret of his success lies more in one direction than another, it is undoubtedly in the marvellous cleanliness of his land. Indeed, "though he said it

as shouldn't," Mr. Ashton cheerily offered a handsome bonus to any one who could fill his hat with twitch grown on Roby Farm ; and that this was no vain-glorious boast, would probably be admitted by any one who has thoroughly examined the farm for himself ; at any rate, in the event of the hat being filled, the bonus would have been well earned by a good deal of hard work in the search.

The tenant considers that by filling up and levelling a large number of old pits, and by eradicating and levelling old fences, he has gained over six acres of land ; he has also planted and reared upwards of five miles of quick fences during his tenancy, and the manner in which this work has been done leaves nothing to be desired ; the whole has been done at his own expense.

Mr. Ashton has also erected extensive Dutch barns for both corn and hay, at a cost of about 320*l.*, besides building two labourers' cottages at a cost of about 400*l.*, one of which is occupied by one of his own men, and the other lets for 16*l.* a year rent.

The live-stock on the farm in November was as follows :—

- 7 working cart-horses.
- 1 brood cart mare and foal.
- 1 nag.
- 2 cows in-milk.
- 1 heifer, near calving.
- 1 calf.
- 3 pigs, fattening.
- 1 sow in-pig.

From the above list it will be seen that Mr. Ashton has long since made up his mind as to the line he means to take, which does not include stock-farming, and he is thoroughly consistent and in earnest ; he keeps not a head of stock on the farm that he can do without ; the cows supply his own house, and probably his men ; the pigs he feeds for home consumption. The work-horses no doubt get plenty of work ; they are a useful, ordinary lot, but not considered by the Judges quite up to the mark for such a high-class farm in other respects. They were one of the few weak points on Roby Farm, which contrasted unfavourably in this respect with the vast majority of the competing farms, on some of which we saw some remarkably fine animals. It is satisfactory to be able to pick some holes in proof-armour like Mr. Ashton's !

The original farm-buildings are somewhat old-fashioned, but ample for the accommodation of what little live-stock the farm carries ; they are kept in excellent order, and call for no further remark. The farm-house is a modern pleasant residence, recently built for the present tenant by the landlord.

The labour employed consists of 3 teamsmen, earning about 22s. a-week; 3 men usually kept all the year round, at 18s. a-week; one old man, at 10s. a-week; besides which the tenant's son assists in the management of the farm and in marketing the produce. The gates, fences, and occupation roads were first-class throughout the farm, and general neatness was everywhere apparent; in fact, next to the cleanliness and condition of his land, his fences, I expect, lie nearest to Mr. Ashton's heart, the pride he took in them was so evident.

Implements on this farm are a superior assortment, and on their skilful application the good cultivation of the farm depends. As Mr. Ashton has furnished me with a complete list, I give it here.

List of Implements on Roby Farm, July 6, 1885.

1 Hay elevator.	3 pairs 2-horse harrows.
1 Horse-power gear.	2 " seed ditto.
1 Hay stage.	2 " bow ditto.
1 Potato sorter.	2 " drill ditto.
1 Potato crusher.	2 Heavy land rollers.
1 Corn drill.	1 Cambridge roller.
1 Water cart.	1 Turnip drill.
2 Waggon.	2 Horse rakes.
2 Large carts.	3 Hay sweeps.
5 Small ditto.	1 Pair chain harrows.
3 Combined mowers and reapers.	1 Winnowing machine.
1 Reaper.	1 Weighing ditto.
2 Grubbers.	1 Turnip-cutter.
2 Scarifiers.	1 Steam chaff-cutter.
3 Double-wrest ploughs.	1 Grass-seed sower.
2 Double furrow ditto.	1 Engine and steaming apparatus.
5 Swing ditto.	6 Ladders.
2 American chilled ditto.	4 Wheelbarrows.

Besides all the hand tools and smaller articles, amply sufficient for his requirements, and all well cared for, and in working order.

The cropping for this year was as follows:—34 acres winter wheat (19 acres after lea, 15 acres after potatoes and turnips), 17 acres of oats (5 after roots, and 12 after lea), 15 acres of Webb's barley, 5 acres of vetches, 22 acres of potatoes, 2 acres of swedes, 1 acre of mangolds, 42 acres of first year's seeds (28 after oats, and 14 after wheat), 22 acres of second-year seeds, 6 acres of permanent pasture. No strict rotation is followed, but it is usually as follows:—

First year:—Fallow crop, mostly potatoes, and a few swedes and mangolds.

Second year:—Wheat sown down with seeds.

Third and fourth year:—Grass, usually cut five times in the two years.

Fifth year:—Oats, and sometimes wheat.

If the total produce of crops this year were added together, and valued even at current market prices, low as they are, there would be no difficulty in proving, without any wish to concern ourselves with Mr. Ashton's private affairs, that his "general management with a view to profit" is on a sound basis, and fully meets the requirements of the Society, even after taking into account the large amount of capital invested in permanent improvements, estimated at 3000*l.* by the tenant, and also the working capital of the farm, possibly 2000*l.* more, and charging a fair rate of interest upon it, and also bearing in mind the large labour bill of something like 600*l.* a year, and also the manure bill of nearly 400*l.* There is, after taking all these things into consideration, no immediate reason to fear that Mr. Ashton is in danger of requiring "parish relief,"—a position which would suit his independent energetic habits of mind and body as little as any man in England.

In walking over the farm, some of the crops being grown in portions of a field made it a little difficult to ensure the various areas under each crop exactly corresponding with the total, especially as the tenant does not himself always know the acreage of each portion of the field; the reader is therefore requested to overlook any slight error in this respect that may occur.

The first field visited was the permanent grass near the buildings on the south side, which has been laid down since 1874. It is in this field that the marl was in former years excavated; but the old pit is now covered with a good sward over its whole area, say 30 yards square, advantage having been taken of a deep natural cutting close by, to conduct a drain from the lowest point of the marl pit into it, laying it dry and capable of growing good herbage, instead of remaining an unsightly eyesore. To return to the grass field itself, it could scarcely be called first-rate grass even yet, but it has been well top-dressed, and has a well-mixed though not very close herbage.

It may here be stated that the bulk of the farm lies pretty compact on the south side of the homestead and of the London and North Western Railway, which intersects the farm; about 30 acres lie on the north side of the railway, and the remainder between the homestead and the railway.

The next field contained a 5-acre piece of Webb's Canadian oats (the seed for which cost 8*s.* a bushel), after roots, and sown down with seeds. This crop, admirably cultivated and perfectly clean, was not quite even, but in July had wonderfully improved,

and will give a good yield ; the young seeds were all that could be wished. The grass-seeds sown by Mr. Ashton, and which he carefully mixes for himself, are composed of twelve kinds, as follows :—

- $\frac{1}{2}$ bushel of Pacey's perennial rye-grass.
- $\frac{1}{2}$ bushel Italian rye-grass.
- 3 lbs. Red clover.
- 3 lbs. Cow grass.
- 3 lbs. Alsike clover.
- 2 lbs. Timothy grass.
- 2 lbs. Cocksfoot.
- 2 lbs. Crested dogstail.
- 2 lbs. Rib-grass.
- $1\frac{1}{2}$ lbs. Trefoil, or hop-clover.
- $1\frac{1}{2}$ lbs. Giant white clover.
- 1 lb. Sweet vernal.

and are sown in the proportions given to the statute acre.

In this respect Mr. Ashton's practice differs widely from that of many of his neighbours, who sow a mixture of red clover and Italian rye-grass only. Nothing, however, could be better than the well-mixed hay produced on this farm in almost every case.

The remainder of the field, some 6 acres, of first year seeds, looked remarkably well. In April, the first cutting to sell green was just commenced ; and in July it was ready to cut again, and will be cut a third time this summer, so we were informed. Following his usual practice, Mr. Ashton top-dressed this piece, after the removal of the first cutting, with sawdust-manure soaked with liquid manure, which was pumped on to it in the midden from the tank, into which the buildings are drained.

From the last field we entered a large field of 24 acres, mostly in potatoes, 6 acres of early, and the remainder Magnum Bonums and Regents ; there were also 2 acres of swedes, and one of mangolds. On the eastern side of the field the land runs to peat moss, and here the early potatoes were set previous to our April visit, and at that time the setting of the Magnums was nearly completed. The whole field had received a heavy dressing of manure, and in July the potatoes were among the most promising of the many good crops we saw, and so were also the mangolds and swedes, both left double for the purpose of planting out later on. This latter is a very general practice in the neighbourhood, but not one which the Judges could altogether approve, as in some cases the plants were left double until so large that they could scarcely fail to sustain injury. It is urged, however, that when transplanted they come

to a good crop; but of this we had no evidence, as the weather was too dry to admit of the operation of transplanting. This field was perfectly clean, and so were the adjoining fences; both had been well cultivated.

From this field we entered a 28-acre piece of first-year seeds after oats. In April Mr. Ashton intended to top-dress this field; the seeds then looked well, and in July a heavy crop of hay had been carted in excellent order, and the clover was shooting away again vigorously.

It may here be noted that "top-dressing" does not by any means always imply the application of artificials; of these manures Mr. Ashton uses very little. The top-dressing he believes in is the one before referred to, viz., sawdust-manure soaked with liquid manure, though this year he has applied some few tons of nitrate of soda.

The next field we saw, 19 acres of winter wheat, "Hunter's White," after lea, to be followed by a fallow crop, was a very clean, level, good crop, and very much better-headed than the majority of wheats we met with. At the southern extremity of the field, however, the land ran to some weak shallow spots; and here the crop, though perfectly clean, was very much lighter; but for this the yield might have touched 6 quarters an acre; short and imperfectly-grown stems were here conspicuous by their absence.

An 18-acre field of second-year seeds scarcely looked so well in April, as the subsequent good crop, in process of cutting in July, would have justified. The hop-clover had developed somewhat abnormally, and rather to the detriment of the heavier clovers (not an uncommon feature, I think, this season). Mr. Ashton, however, says he likes it, and he ought to know best, though on this point opinions would no doubt differ.

Sixteen acres of first-year seeds were good on the lighter side of the field, but hardly so good on the stronger land.

Three acres of second-year seeds in July we saw in process of cutting—a heavy well-mixed crop to sell green.

A 12-acre field of White Poland oats after lea looked exceedingly promising over the greater portion of its area; it showed, however, some weak places where the crop is short and thin, looking as if the soil was shallow. Still these spots were not large, and will not prevent a heavy yield of possibly 7 quarters, or more, per acre.

An acre and a half of potatoes adjoining the farm-house garden were very clean, healthy, and promising. Mr. Ashton finds it advisable to buy a truck-load of about 4 tons of seed-potatoes direct from Scotland every year, and from the produce of these he saves seed for the following year's crop.

The piece of first-year's seeds on the north side, between the house and the high road, was being cut for grass, and was a heavy crop of the best quality. The earliest cut from the first-year's seeds is secured by sowing a few acres each year early in the autumn, after vetches or early potatoes; in the first year three green cuttings are usually taken off, and in the second year the seeds are twice cut for hay.

The first cut of grass should yield about 12, the second 7 or 8, and the third 9 or 10 tons per acre; and the second year, the first hay-crop will probably not be less in a favourable season than 2 to 2½ tons, and the second crop from 1½ to 2 tons.

In a narrow field of 5 acres, lying between the almost parallel lines formed by the highroad on the south and the railroad on the north, we saw the most luxuriant crop of vetches mixed with oats that can easily be imagined. This was to be cut green for the Liverpool market, where it will probably command the high price of 20s. a ton; and if the grass-crops reach 12 tons an acre, it is difficult to see how this strong-grown succulent bulky crop of over 4 feet in length, and standing in July wonderfully well (it is too thick to lie), can possibly weigh less than from 15 to 17 tons to the acre.

Through the railway-bridge on the left hand is a 15-acre field of Webb's Kinver barley, which cost for seed 10s. a bushel. This crop might be better, and it is decidedly light over a considerable area; but there is this redeeming point about Mr. Ashton's farm, in which it differs from most people's, and that is, that if on certain spots the crop sown does not fully develop itself, at any rate nothing else does. Weeds are almost as scarce here as in the garden of Eden before the Fall. They cannot escape Mr. Ashton by hiding in fence-bottoms, or anywhere else, and this field was as clean as the rest.

Joining the last field is a 15-acre piece of Hunter's White wheat after potatoes and roots. This crop the Judges were unanimous in considering to be sown too thick, as evidenced in the comparatively weak straw and small heads: 3 bushels is the seeding given by Mr. Ashton, and nothing will convince him he is making a mistake; but I did not ascertain that this deep-rooted conviction of his was the result of carefully tested experiments, and I cannot help hoping that so shrewd a man of business will take steps to satisfy himself on this point. Surely he will find that 1½ bushels to the acre instead of 3, sown early on clean land, in a high state of fertility like his own, will produce a far better crop than this, which, although looking well in April (almost too well), in July disappointed us very much, as we then thought it could hardly reach 4 quarters. I am well aware that caution is necessary in departing to any great

extent from the "custom of the country," and there thick sowing, especially of wheat, is the rule; but, without going to the other extreme all at once, and sowing too thin, a gradual reduction in the quantity of seed over a portion of the wheat-area each year, comparing it and testing it with the thick-seeded crop, could do no harm, and might lead to great results. It appeared to us that on some of this really good land, clean, and in high condition as regards fertility, there is no reason why the wheat should not attain the maximum weight of which this crop is capable; as it is, notwithstanding the fact that this looks like being a "wheat" year, the majority of wheats which came under our notice in this competition were open to great improvement, both in size of ear and strength of straw. And not only in this year's crop, but also in last year's stacks (many of which were still standing, waiting, we were told, to see what "Nicholas" would do), the same fault could be found, viz. weak straw and small heads.

The above wheat-field concluded our inspection of crops, our method of examination in every case being to take each field in "skirmishing order" from end to end, an equal distance apart; and on a hot day in July, through crops such as those standing on Roby Farm, this was found very fair exercise.

As to the general impression produced on the Judges, there may have been in the case of Mr. Taylor a pleasurable disappointment because his diligent search for really fine specimens of *Triticum repens* (a plant common in some districts) had here been so ill-rewarded. To do that gentleman justice, however, on no occasion did he spare himself in making wide and scientific "casts" here and elsewhere with this object in view, and perseverance such as his, it is needless so say, met with some measure of success on certain farms which shall be nameless. In the case of my other colleague, Mr. Hutchinson, a great stock-breeder like himself must be forgiven if there were some signs of lingering regret in his mind, that his branch of husbandry should find so little place on this admirably managed farm. But, apart from considerations such as these, no doubt ever existed, and there was no difference of opinion as to the fact, that Roby Farm must be placed first in Class I.

Mr. Ashton, who keeps no elaborate accounts, gave, amongst other information, the following figures.

The first corn-shed he erected was in 1878, the measurements are as follows: height to eaves, 20 ft.; length, 112 ft.; breadth, 24 ft., with a lean-to against the barn wall 45 ft. long by 15 ft. wide, screwed to the building; the whole work well and substantially done: the wooden uprights are let 4 ft. 6 in. into the ground, charred at the bottom, filled in with asphalt, and

rammed, all the uprights and beams being fitted with wrought-iron knees, and all bolted together; the roof is of corrugated iron of 18 gauge. The cost of this building, including everything, was 220*l*.

Another similar shed for hay has been erected this summer, 48 ft. long by 18 ft. broad, and 28 ft. to the eaves, joining the corn-shed before mentioned by a covered roadway between, of 14 ft. wide, the roofs being continuous; the open side is boarded from the eaves downwards to a depth of 11 ft. for shelter; the cost of this structure, including tarring, was 110*l*.

Mr. Ashton considers that he has already stacked this year 160 tons of hay of the best quality, and worth, to sell, 5*l* a ton. He has already sold 10 acres of first-crop grass, 12 tons to the acre, at 20*s*. per ton; also 5 acres of second crop, 10 tons to the acre, at 24*s*. per ton; also 5 acres of vetches, over 16 tons the acre, at rather under 20*s*. For his straw he expects to realise the high price of 3*l*. a ton, and also that he will have over 110 tons to dispose of this year. *Per contra*, he has carted home 800 tons of horse- and cow-dung, which, with 120 tons made at home, goes on to the fallow crops, 300 tons of sawdust manure used for top-dressing, and about 400 tons of night-soil, ploughed in for corn on heavy land. The American chilled ploughs are much appreciated, and a note as to the satisfactory work being done with them for potatoes, was made by my colleagues in November.

CLASS I.—SECOND PRIZE, £25.

Mr. Charles Sherwin, Ashley Hall, Altrincham.

					A.	B.	P.
Arable	..	..	..	..	214	3	4
Pasture	..	..	..	..	14	2	37
Total					229	2	1

This farm is very pleasantly situated $1\frac{1}{2}$ miles south of Altrincham, and about 4 miles north of Knutsford. It is on Lord Egerton's property, and is held on yearly tenancy with no restrictions. The tenant speaks highly of both the present and the late Lord Egerton as landlords.

Mr. Sherwin had only held this farm five years in March, 1885. The rent is 500*l*., and the tithe 30*l*.

For the first two years the tenant received 15 per cent. reduction, but not since; at that time the rent was raised 100*l*. a year, with the understanding that the landlord would execute all necessary repairs, finding all material and labour, and also

drain the farm, where it required it, entirely at his own expense. This, and a great deal more, has been done, including a substantial set of entirely new oak gates and gateposts, painted, and well set up.

Besides the above landlord's improvements, the tenant has done an immense deal during his short occupation, partly with the assistance of his landlord (as in the case of new fences, the landlord finding quicks and rails, and the tenant the labour), and partly at his own expense entirely.

Everything done either by the landlord or the tenant, or by both together, has been done in the best and most workmanlike manner possible, reflecting great credit on all concerned. There is a very large head of ground-game on this farm, especially hares, for which the tenant blames the keepers; also a large head of winged game. Some five or six game-preserves are either upon or adjoining the land in this occupation, and altogether it is surprising how such a great length of young quick fences can flourish as they do in the midst of so many enemies. I counted over thirty-five hares in sight at one time in one field.

Nevertheless, the fences on this farm are remarkably strong and good; and by dint of careful attention in stimulating a rapid growth, by the application of sawdust-manure (which also retains moisture on the surface), and by keeping them perfectly clean, and also in liming the bottoms of the young fences, the hares are in a great measure defeated. In some places, however, they would take no denial, and there the young quicks had been a good deal punished in consequence. Mr. Sherwin has just erected in his stackyard a very excellent and commodious hay-shed, 26 yards by 23 yards, carried on 19-foot wrought-iron pillars; this building cost the tenant 250*l.*, and looks a great deal for the money. It is formed of three parallel spans, the outside ones being each 8 yards and the central span covering 7 yards, with an open overlap on the adjoining spans, on to which the water is discharged and carried away by the spouts attached to the inner side of the outside span. The whole is spouted, and the roof is formed by semicircular spans of 22 gauge corrugated iron, and presents a very imposing appearance.

The system of farming consists in selling almost all the hay into Manchester, and bringing manure back. Potatoes are grown for sale on a considerable acreage, and there is, besides, a large off-put of corn annually.

The dairy of 30 cows is kept to supply a retail new-milk trade with Altrincham; 3½*d.* a quart being the price obtained for winter, and 3*d.* for summer milk.

All the heifer-calves are reared, and the bull-calves sold at 3*l.* a-head, for breeding purposes, as soon as they are dropped.

The live-stock at the time of our first visit was as follows:—

<i>Horses</i> . .	6	Very good draught-horses.	
	1	Horse for the milk-cart.	
	1	Nag.	
<i>Cattle</i> . .	1	High-class pedigree Shorthorn bull.	
	6	Useful in-calf heifers.	} All bred by the tenant.
	10	Good yearling ditto.	
	3	Calves.	
	30	Dairy cows of a very good class.	
<i>Sheep</i> . .		None.	

The above stock were all in good thriving condition. The horses were getting about 10 stones of crushed oats and bran a week, with long hay at night.

For the horned stock, the system is to grind all the offal corn, both wheat and oats (barley is not grown, on account of probable damage from hares, though the tenant would like to grow it), also maize, &c.; in fact, whatever can be bought cheap, and represents the best money-value at the time of purchase.

Corn for market is dressed very highly.

Labour is represented by seven men and three boys, whose joint wages come to about 500*l.* a year.

Manure.—Very little artificial manure is used except bones, and this is put on the seeds in the autumn, about 8 cwt. to the acre. About 17 tons were used in 1883; and last year, in November, there were 10 tons in a shed ready to go on to the seeds at once.

Six hundred tons of manure, purchased in Manchester, is chiefly horse sawdust-manure; and 500 tons of farmyard-manure are made at home. Fifty tons of lime are purchased every year.

Of Implements there was a very complete assortment, in exceedingly good order, a large shed being set apart for housing them, with a yard in front, secured by good gates, which the tenant had himself found; and there was a large number of modern, well-selected ploughs, harrows, grubbers, scufflers, drills, reapers, &c., too numerous to mention, but all conveniently arranged, and ready for work at a moment's notice. The cart-sheds contained all necessary farm-carriages, and no rubbish.

There is an excellent Marshall's 8-horse portable threshing-engine and threshing-machine; the former also drives the corn-crusher, while the chaff-cutting and pulping are done by horse-power.

On our last visit we found that Mr. Sherwin had executed, at his own expense, a very substantial improvement in the shape of putting up a boarded floor in what had been an old barn, at the east end of the range of buildings next the stackyard, and

had fixed upon it a Nicholson's grist-mill and cake-crusher, both of which can now be driven by the portable engine standing in a lean-to shed adjoining it on the north side. This shed had been erected for the purpose by the tenant, and the whole arrangement is well conceived and carried out.

The buildings contain ample accommodation, and have been put in good repair. They are altogether made the most of by the tenant; but they were evidently built in the days when time and space were of no consequence. They consist mainly of two long parallel lines of continuous roof, about 50 yards apart, which must involve great waste of time in walking backwards and forwards. The northern of these ranges, about 80 yards long, is chiefly arranged as cattle-sheds or byres, the eastern end being conveniently occupied, as before stated, by the recently erected food-preparing apparatus.

The southern of these ranges of buildings, about 65 yards in length, is occupied by stables, horse-boxes, and cart-sheds. The granary above is laid out in partitions, and is kept very neat and business-like; at the west end of this range there is a labourer's house and implement-shed and yard. There is also an open yard, with a good shed for young cattle in the north-west corner of the stackyard; and near the farmhouse is a recently erected range of covered pigsties, well executed. But with all these widely scattered buildings there must be great inconvenience, and they are not adapted to Mr. Sherwin's high-pressure style of farming.

Apart from the business point of view, it is a fine rambling old place, and might well be the scene of a three-volume novel. The quaint roomy old house (dating back to King John, if I mistake not), and fine old-fashioned high-walled garden, are most harmonious, although not at all the usual style of premises on a farm of 229 acres, and of course never built with that intention. It is rather a residence and premises where a man with two or three thousand a year could live in a style befitting his income.

However, Mr. Sherwin takes it as he finds it, and he also makes himself very comfortable; though in his able hands the large garden, kept in beautiful order, is heavily cropped, and, instead of being voted an encumbrance and expense, as it might be by a less industrious and painstaking tenant, it pays its way handsomely, and must at the same time, I am sure, afford much pleasure to Mrs. Sherwin and her family.

I think Mr. Sherwin said that Assheton Smith, the well-known sportsman, lived here at one time, and hunted in the neighbourhood. It is with the land, however, and the manner in which it is cultivated, that we must concern ourselves.

Before entering on the crops, it may be stated that for the state of his occupation, roads, fences, and general neatness, Mr. Sherwin must be given the greatest credit; the new gates all over the farm also look remarkably well, but for this we must give Lord Egerton some credit.

The rotation of crops is usually as follows:—

Seeds, laid down for two and sometimes three years.

Oats.

Potatoes, turnips, and mangolds.

Wheat, sown down with seeds.

Potatoes were occasionally diseased, until within the last three years, since when new seed has been used, with the effect of checking it.

A 13-acre field, on the north side of the stackyard, in old pasture, was broken up after liming, and trench-ploughed last autumn, and now carries 8 acres of very good swedes, which have received 5 cwt. of dissolved bones per acre; also 2 acres of kidney potatoes set with cabbages in the sides of the drills.

Eighteen acres in the next field of Regent and Magnum potatoes looked remarkably well, on a well-cultivated deep sandy loam oat-stubble, mucked last autumn and ploughed in, 20 tons to the acre, and set with 3 cwt. of dissolved bones: this field is clean and promising. Some half-acre of waste land on the north side of it, noticed by the Judges in April as somewhat unsightly, in July was all cleaned, and planted with potatoes and cabbage—a great improvement.

Sixteen acres of white Poland oats, after two years' lea twice rolled, were good, but rather dirty on the north-east and north side, while the remainder of the field on better land was about the best piece of oats we met with.

Sixteen acres of "cut" oats, on the north side of this field, after two years' lea, was a moderate crop; uneven, but fairly clean.

Fifteen acres of late-sown oats to the west, sloping down to the river Bollin, after one year's lea, looked upon as the worst land on the farm, certainly carried the worst crop; it was terribly grubbed and bad all over, very much choked with annuals; the crop would have been better out of sight in a silo, and the land ploughed for tares or white turnips.

The work done in permanent improvements on this field, namely, taking out an old fence, levelling, and filling-in, cost the tenant 80*l.*; the field has also been recently limed.

Sixteen acres of Black Tartar oats were a very heavy crop on the east side, and good all over, except towards the west end of the field, where they turned lighter; the whole was fairly clean.

Twenty-four acres, in second year's seeds, had been top-

dressed with 8 cwt. to the acre of $\frac{1}{4}$ -inch bones last year; this field was being cut for hay, and though not quite even, was a good well-mixed crop of about 2 tons to the acre; the northern corner of this field, now in third year's grass, had given the tenant a great deal of trouble, in taking out twenty-seven large trees and levelling holes.

Eighteen acres of second year's seeds promised a heavy good crop, fit to cut; it had been top-dressed with 5 cwt. of dissolved bones per acre.

Seventeen acres of first year's seeds had cut a heavy crop of hay, and was nearly fit to stack.

Ten acres of first year's seeds, south of the homestead, after oats sown on old sod, was patchy; not much clover, strong ryegrass. The fence between this field and the home croft on the north was a bad one, but was well made up and planted with young quicks.

The croft itself, 3 acres, is laid down in permanent pasture; this, being the first year after oats, has been top-dressed with 8 cwt. of boiled bones to the acre, costing 7l. a ton.

The tenant has constructed an excellent masonry watering-place in this croft, on the south side, the landlord finding materials.

Ten acres of first year's seeds, to the south-east, had been cleared in July of a heavy crop of hay, thought to be 3 tons to the acre.

In a 6-acre field of first year's seeds, at the time of our July visit, a good crop of hay was in process of harvesting, by two forkers and two loaders to each waggon. This field will be mown again.

The north side of the last field joins a covert, and on the north side of this covert is the 14-acre permanent pasture field, of strongish land drained 5 yards apart and 30 inches deep; this was eaten pretty bare by the dairy cows. It is all the pasture Mr. Sherwin has till the hay is cleared, until which time the keep they pick up here is supplemented by grains, mangolds, and sharps. These cows were looking remarkably well when we saw them in July.

The approach from the lodge is well fenced with continuous iron hurdles, substantial and well painted; these cost the tenant 3s. 6d. each, and look exceedingly neat.

A large field of Webb's Kinver Giant wheat, of 24 acres, in the centre of the farm, is not so good as it should be; it is uneven and dirty, and only in some small portions is it a good crop. The yield will probably be under 4 quarters to the acre; this and the 15-acre field of oats on the north-west side of the farm are the two worst bits of husbandry on the place.

This completes our round of Ashley Hall Farm; and, coming as it does immediately after that of Mr. Ashton's, with all the advantage of a long tenancy, one cannot but be struck with the enormous amount of work that has been done here in five short years by its enterprising occupier; in the removal of trees and 18,440 yards of old fences, and in the filling-up of pits, &c., which he has done at his own expense, though he has been well seconded by his landlord in his praiseworthy efforts, as all good tenants ought to be.

Mr. Sherwin held a good position in farm competitions as early as 1882, when his farm was honourably mentioned by the County Society's Judges next to Mr. Ashton, who took the premium.

CLASS I.—SPECIAL PRIZE.

Mr. James Callwood, Chelford, Crewe.

Arable	.. ..	116 acres.
Grass	.. ..	42 ..
Total	.. ..	158 ..

This farm is the property of Major Dixon, and consists of light sandy loam. There are no restrictions as to cropping or sale of produce. There is no agreement. The rent is 345*l.*, 30*s.* a year more than that paid by the former tenant.

Mr. Callwood has a large family, and is evidently a most industrious man; he has been tenant of this farm seven years, and during his tenancy has effected many great improvements in his holding, at a total cost of 358*l.*

The farm is distant from Manchester about 20, and from Crewe about 16 miles, and lies directly between these two places, to which there is good access both by road and rail; Knutsford lies 4½ miles to the north-west.

The stackyard and premises, on our second visit, were in very good order; attention having been called to a little deficiency here in November, the buildings are now spouted.

Mr. Callwood has erected one useful Dutch barn, at a cost of 37*l.*, and another one he bought from the out-going tenant for 40*l.* He has also erected an excellent fowl-house and lean-to implement-shed, roofed with smooth galvanized-iron sheets.

There is a good assortment of implements, including a potato-lifter by Allan & Sons, of Dunkeld, which the tenant likes very much, though at first there was a strike in the district

against using it. He also uses two American chilled ploughs, and highly approves of them, both for efficiency in working and lightness of draught. I may say here that wherever these ploughs were used they were well appreciated. These, and all other necessary implements, were kept under cover, and around the shed the hand-tools were neatly hung up.

In November, the corn-stacks then standing were small, and not well built.

The live-stock in November was as follows :—

4	Draught horses.
2	„ colts.
1	Very good colt.
35	Milking cows.
12	In-calf heifers.
15	Rearing calves.
1	Pedigree Shorthorn bull.

All the above-mentioned stock are very good.

No pigs or sheep are kept.

The large dairy of cows did not contain one inferior animal, and all looked like paying their way ; they are mostly home-bred. In July there were 28 cows and 9 heifers milking.

The horses were remarkably good powerful animals. Mr. Callwood is evidently too good a judge of stock, and too careful a breeder, to care about keeping any rubbish.

The Shorthorn bull, purchased at the Birmingham Show for 30 guineas, was worth the money, and looked like sustaining his owner's credit.

Mr. Callwood's "General Management with a view to Profit" will be sufficiently evidenced by a few figures taken from his account-books, tidily kept, which we were permitted to see.

In 1884 to 1885 the milk of thirty-five cows sold as under :—

			£	s	d.
1884	May	Milk sold for	99	4	10
"	June	" "	87	19	6
"	July	" "	91	9	10
"	August	" "	89	0	0
"	September	" "	69	16	0
"	October	" "	82	19	2
"	November	" "	70	1	3
"	December	" "	69	19	7
1885	January	" "	74	2	10½
"	February	" "	66	18	6
"	March	" "	91	18	10
"	April	" "	81	18	10

Total milk sold, carried forward .. £975 9 2½

From May, 1884, to April, 1885:—

			£	s.	d.
Total milk sold, brought forward	..	..	975	9	2½
Cheese made and consumed	..	..	21	0	0
Butter sold and consumed	..	..	31	5	0
Calves reared and sold, £1 each	..	..	30	0	0
Total produce for 1 year			£1057	14	2½
Average per cow			£30	4	4

This must be considered a remarkable average over such a considerable number of cows.

Potatoes last year sold for 443*l.* 3*s.* 9*d.*

All surplus straw is sold. Mr. Callwood's account with the Cheadle Asylum (chiefly for oats and straw) last year amounted to 164*l.* 16*s.* 11½*d.*

A large amount of corn sold annually, together with the above totals, justifies us in concluding that Mr. Callwood's business meets the first requirement of the Royal Agricultural Society.

The purchased-food bill for grains and oilcake last year was 117*l.* 15*s.*, besides which corn to the value of 168*l.* 1*s.* 3*d.* was consumed.

Purchased manures for last year were as follows:—

			Tons.	cwt.	qrs.	£	s.	d.
Ground bones	..	..	11	5	8	65	17	6
Nitrate of soda	..	..	1	10	0	15	0	0
Horse manure	..	..	118	12	3	35	13	4
Total			..	..	..	£116	10	10

The wages were:—

			£	s.	d.
1 waggoner at 1 <i>l.</i> a-week	..	..	52	0	0
1 labourer at 15 <i>s.</i> a-week	..	..	39	0	0
1 cowman at 15 <i>s.</i> a-week	..	..	39	0	0
1 man in house at 7 <i>s.</i> a-week	..	..	18	4	0
Meat	..	..	20	0	0
Extra labour in harvest, &c.	..	..	10	0	0
Potato getting	..	..	48	0	0

Making a total for labour of .. £226 4 0

This is moderate, but it must be remembered that the tenant works hard himself, and so does Mrs. Callwood, his daughter aged 18, and also a son of 16, and one of 10 years of age. In fact, on the day of our visit in July, the tenant and the above members of his family had milked all the cows and tended all

the stock without stopping any other hands from the hay; yet still it appeared to us that the heavy valuable crop then in hand would have justified more labour than we saw employed in securing it.

The milk is all sold in Manchester, at 10d. a gallon in winter, and at 8d. in summer, except Sunday's milk, which is made into butter and cheese.

The farm generally is well cultivated, and in previous farm competitions Mr. Callwood has had a fair share of success, considering his short tenancy. He also won a local Farm Prize in 1883.

The farm, though compact and in a ring fence, suffers inconvenience by severance, the London and North-Western Railway running right through the middle of it. Also some land on the west side lies awkwardly, and a long way from the homestead.

The rotation of cropping usually followed is:—Seeds lay for one, two, or three years, according to the plant; then fallow crops, chiefly potatoes; after which oats or wheat, and the land is then sown down again.

Cropping.—Oak Meadow, 4 a. For permanent pasture; has been down four years, and looks excellent grass now.

Brook Meadow, 4 a. Webb's Canadian oats, sown down with seeds, is a capital crop, and very clean. The side next the road used to be looked on by gipsies as their own, for camping purposes; but, by a lot of heavy work, Mr. Callwood has levelled an old sandpit, and at the expense of about 30l. has brought this portion into cultivation with the rest of the field. The oats are, even here, a good crop, and the field is now very well fenced from the road by the landlord with good young quicks and double rails.

Sand Field, 20 a. Second year's lea. For grazing, this looked bad in April, a poor thin root; and in July there was no improvement. This is a large area to be in so unprofitable a state, and is one of the principal blots on this farm at the present time.

Barn Field, 17 a., joining the last, in permanent pasture, is a piece of well-grazed, sound, good turf, and seems to carry a large head of stock.

Glebe Field, 8 a., joins the last; it contains a splendid crop of swedes, the best we saw anywhere in our travels, nearly meeting in the drills, and growing fast, though the weather was very dry. There was a little twitch to be seen here, however. Three cwt. of mineral superphosphate and nitrate, in equal portions, had been sown with this crop.

Clover Field, 30 a., all in potatoes, after 3 and 4 years' lea,

grown with nothing but farmyard-manure, was a grand crop ; both Regents and Magnums ; very well cultivated, and clean.

Big Lime Field, 15 a., first-year's lea. On this field, which cut a heavy crop of hay on June 22nd, a good strong second growth is now coming away.

Hoppit Field, 14 a., first year's seeds. A very heavy crop of hay partly cut ; could only cut one way.

Devenport Field, 5 a., "Cut" oats. This crop was very foul with charlock, and was not a credit to Mr. Callwood ; there was not much "twitch," however, and there may be a fair yield.

Well Field, 5 a., Canadian Poland oats sown with seeds ; with the exception of about 2 acres on the low side, was an extra good, "gifty"-looking crop.

Little Lime Field, 9 a., second year's lea for hay, had been pastured till May 20th, this year, and cut two crops of hay last year, after an early boneing ; this year 1 cwt. of nitrate has been top-dressed per acre, and there is a good length of it, but rather thin on the ground.

Brick-hill Field, 18 a., Golden drop, winter wheat, laid down with permanent seeds, looked rather late sown and thin in April, but in July had improved immensely and was a nice level crop ; 120 lbs. of seed per acre had been sown and ploughed in with *ribbing* plough.

The fences on this farm are inferior, and the existing ones, often on the top of old banks, are hardly worth patching ; but I feel sure Mr. Callwood will put this to rights in the course of a few more years of war waged against them, and of substituting better ones where needed. Some of the points of management on this farm, however, especially stock, would compare favourably with anything we saw elsewhere ; and "all round" his farm does Mr. Callwood great credit.

CLASS I.—HIGHLY COMMENDED.

Mr. William Scotson, Mossley Hill, Liverpool.

Arable	..	..	..	290	acres.
Pasture	..	..	..	12	„
Total	..	..	..	302	„

This farm lies close on the outskirts of Liverpool, and will probably in the course of a few years be absorbed into that gigantic and rapidly increasing town. In driving from Lime Street Station, Liverpool, as you approach Mr. Scotson's farm, bricks and mortar, in process of building, appear to occupy square miles of ground ; and already the selling price of

Mr. Scotson's farm would be reckoned at 5*s.* the square yard. The whole of it is now on sale and is the property of several owners, viz. :—T. E. Withington, Esq.; J. Kennedy, Esq.; C. W. Newmann, Esq.; J. Booker, Esq.; Mrs. Bibby.

The farm is held under a yearly tenancy subject to no restrictions. Rent and tithe amount to 3*l.* 10*s.* an acre, and the rates are heavy.

The land, with the exception of some half-dozen small fields, lies well together and is well laid out; the soil on the central portion of the farm is light, running to moss in places, but where the ground rises it assumes the well-marked features of the New Red Sandstone formation, mostly free-working, with a good deal of gravel, but in some portions being a pretty strong red clay.

There is, besides the Mossley Hill Steading, the Pitville Steading, and produce is stacked at both places as may be most convenient.

Neither of these premises are quite all that could be wished, in either accommodation or arrangement; but, though Mr. Scotson has done a great deal of useful, rough-and-ready work to meet his requirements, it can hardly be expected that either the owners or the tenant will plunge into any great expense on land situated as this is.

The general system of farming adopted is, no doubt, the correct one: to sell everything the farm produces in Liverpool, and bring back manure; but Mr. Scotson does not so rigidly adhere to this principle as did our old friend Mr. Ashton. Here it is thought desirable to keep a certain number of cattle, "to eat up," as Mr. Scotson says, "the produce which will not sell in the town." As these "scavengers" consist mainly of a dairy of 16 remarkably good cows (to any one of which it would be an insult to use the term in the usual sense in which it is understood), and as there is such a near and excellent market for new milk, this deviation is so far justified; whether it should go further and include the rearing of young cattle and feeding of beef, is more open to question.

We saw no signs of an abundance of inferior farm produce, and we doubt whether any stirk or bullock could possibly consume the best quality of produce to leave as much money as would the direct sale of it and loading back with manure.

Live-stock includes as under:—

- Horses* .. 10 Very useful carthorses.
- 2 Ponies.
- 1 General-purpose horse.
- 1 Cart colt rising 3 years, very promising.

<i>Cattle</i> ..	16	Cows in-milk or in-calf; a good class.
	2	„ outside.
	1	Pedigree Shorthorn bull.
	16	Welsh grazing steers.
	13	Store cattle.
	12	Calves.
<i>Sheep</i> ..	140	Fat sheep (50 sold to the butcher previously).
	60	Cross-bred hoggs (mules).
<i>Pigs</i> ..	3	Breeding sows.
	1	Boar.
	25	Store pigs.
	15	Fat pigs.

The fat sheep had all gone off in April. The feeding pigs were doing well on boiled wheat and potatoes. The tenant thinks they do best when lying thick on the ground, and he fills up their ranks with new ones as they are killed off.

All the milk is sold retail at 2d. a pint.

There is a want of strict *economy* in most respects, throughout, in the management; there is no accommodation for carts, &c., and these have to stand about anywhere and in all weathers. There is hardly the close attention to detail which should always be exercised, and is more than ever necessary where both rent, rates, and other expenses are high, as in this case.

Having unburdened my mind of this reflection, I must proceed to do Mr. Scotson the common justice to admit, that in general management, with a view to profit, the results appeared to be eminently satisfactory. Mr. Scotson is a thoroughly business-like, practical man, and “bosses his own show,” as the Yankees say.

The principal returns are made from cutting green grass to sell to horse and cow keepers in Liverpool, and the remainder of the rotation grass is made into hay and sold. Potatoes are largely grown for sale; and fair crops of corn and straw, the best of which is sold, and the worst consumed, must bring in a good deal of money, besides the milk and sundries, which bring the gross income of the farm to a very respectable total.

Milk, from the tenant's figures, brings in about 400*l*.

On July 9th, 116*l*. worth of green grass had already been sold.

About 120 tons of hay is sold annually.

No straw is used for litter, potato-haulm taking its place.

Cotton-cake, mostly undecorticated, is purchased, also linseed-cake and bran. Swedes are mostly consumed.

Mr. Scotson took the third prize,—a Gold Medal,—in the Royal Agricultural Society's Farm-Prize Competition in 1877.

The tenant has done all fencing and temporary buildings at his own expense.

Rotation of crops:—

Seeds laid down for 1, 2, or 3 years.

Potatoes and roots.

Oats or wheat sown down again.

Mr. Scotson sows 11 pecks of wheat to the acre, and, as the result, it everywhere showed the weak straw and small heads of which we have complained elsewhere, and largely conducted to the feeling of disappointment experienced by the Judges in July, when their expectations of extraordinary crops formed in April were not realised.

The first year's seeds are cut twice, and sometimes three times; the second year they are often cut twice.

After the first cut of hay, some more alsike clover and Italian rye-grass is sown, and it is considered that this helps the next crop. Seeds cost a little under 20s. the acre. Italian rye-grass, red clover, alsike, cow-grass, foxtail, and white clover, is the mixture used.

Mr. Scotson has managed the farm 30 years, and for the last 20 years on his own account.

Crops.—The old pasture joining the farmhouse was rather rough and not very attractive looking.

Four and a half acres of mixed winter wheat, after oats, looked promising in April, but wanted rolling. In July it was an ordinary good crop of barely 5 quarters to the acre.

Thirty acres of barley, mixed Awnless and Hallett. This field varied from good loam to poor moss; it is said to have been greatly improved by the town manure which the tenant has applied. The greater portion of this crop was inferior and full of annual weeds, heavy, and laid on the south side, but could hardly average a fair yield.

Two acres of potatoes (after grass cut on June 1st) was a fair crop, considering how late they were put in. The headlands were dirty and untidy. A small piece of oats was good.

Thirty acres of oats on the opposite side of the London and North-Western Railway were a very good, level, clean crop, partly Webb's, and the top part of the field another variety. All were good, except a small portion on the west side, where the soil was thin and close to the rock.

Thirty-one acres of first year's seeds adjoin the last field to the south. From here a good crop of hay had been carted. The clover-root looked a little patchy. At the south end of this field a paddock was fenced off, and the above-mentioned 60

cross-bred sheep were grazing it. They had not a thriving appearance, and wanted dipping and a fresh bite.

Five acres of second year seeds, eaten late with sheep and now for hay, would not cut a heavy crop, but was sweet, and full of alsike.

Three acres of first-year seeds. First crop sold green and part cut a second time.

Two fields of oats, about 20 acres altogether, were not quite level, but a good crop.

Fifty-eight acres of winter wheat, in three fields all joining, nearly all after potatoes, too thickly sown, will not be over 4 quarters an acre, instead of 6, as we expected to find it. The old story—weak straw and small heads.

Two large stacks of old hay and 1 large stack of wheat, unthreshed, stood in the Pitville stackyard, waiting to see whether or not the "Clouds roll by" of prospective war with Russia.

Eleven acres of potatoes may lift a good crop, but we have seen better and cleaner. Mr. Scotson does not mind some "twitch" in his potato drills, in fact, rather likes it, he says. His standard of a good crop is high, however, ranging from 9 to 15 tons per acre.

A waggon of oat-straw loaded for market, containing 35 cwts., would bring 3s. 5d. a cwt. we were told—a good price certainly.

Three small seed fields, one first year and two second year, were cleared of hay.

Sixteen acres of potatoes, mostly Magnums, and some Champions after lea, to be followed by wheat, were a very fine crop and clean.

Fourteen acres, about half in potatoes—Magnums, Champions, and Kidneys—the latter sown in rows alternating with the late variety, had been lifted, and white turnips were now growing in their room, and had already been singled. The other half of this field was in swedes and mangolds—very fine plants, but not well cultivated. There were many doubles, left on purpose, Mr. Scotson says, to pull later on and sell for cooking. We were told that this would sometimes realise 13l. an acre. These swedes are sometimes also sold untopped to cowkeepers at 30s. a ton, early in the season.

The double mould-board ploughs used here for earthing up the drills had hinges on the last 9 inches of the mould-boards, allowing the setting out wider of the posterior flap so formed. This is found to make good work, and raises a nice shoulder of mould on the drill.

Twelve acres of outlying land on the north-east side of the farm was half in barley after wheat, and the remainder in winter wheat. The former was a rather light, fairly clean crop; the

wheat was a good crop of about 5 quarters an acre, probably the best on the farm.

Fifteen acres of outlying oats, further to the north, after two years seeds, were a very good clean crop.

This concludes the inspection of crops on Mossley Hill Farm, which, on the whole, were not what we expected to find them.

The fences and ditches round many of the corn-fields were exceedingly foul, and full of rank grass and weeds.

Some of the young fences were clean and very well done by.

CLASS I.—HIGHLY COMMENDED.

Mr. William Turton, Burnt Mill Farm, Liverpool.

				A.	R.	P.
Arable	..	..	..	106	2	7
Grass	..	..	..	9	1	9
Total				115	3	16

This farm is under the Agricultural Holdings Act. The present tenant has lived here 17 years, and his father and grandfather before him, the former 30 and the latter 35 years.

The farm lies 10 miles south-east of Liverpool, and is the property of Col. J. J. Blackburne, M.P., of Hale Hall. The soil is strong red clay, with some gravel. The rent is 240*l.* and the tithe 14*l.*

The pasture is a strip of marsh land, which sometimes floods over the embankment, and lies at the south end of the farm.

Among the improvements effected by Mr. Turton may be mentioned :—

The eradication of 5000 yards of old fences.

Planting 4500 yards of new fences, the landlord finding quicks, and nowhere did we see this class of work better done.

Filling up fifteen old pits, and bringing this area under cultivation.

Re-draining a portion of the land.

Erecting a new corn-shed, at a cost of 60*l.*

Making a new stackyard, 60 yards by 30.

Making two tanks for liquid manure.

Planting a new fruit-garden, now a source of considerable profit.

Carting materials for a new house.

Carting away the old house, &c., &c.

The above is sufficient evidence of the painstaking industry exhibited on all sides on Mr. Turton's farm.

The system of cropping is as follows :—

Seeds are allowed to lie in three years, are then broken up for potatoes, turnips, or other fallow crops. After this comes wheat, and finally oats, again sown with seeds.

The live-stock kept is as follows :—

- 6 Very good carthorses (including a brood mare).
- 1 Pony.
- 4 Good milk-cows.
- 2 Fat calves.
- 2 Yearling steers.
- 2 Yearling heifers.
- 4 Heifers under 2 years old.
- 1 Heifer under 1 year old.

The cattle are all fairly good.

Pigs .. 1 Breeding sow with 5 pigs.

- 1 Fat pig.
- 2 Stores.

Besides 6 fat pigs just sold.

An occupation road one mile in length is kept in first-rate order, and the fences on each side are clean and perfectly kept.

Manure.—The tenant uses about 2 tons of dissolved bones and about 2½ tons of nitrate every year. About 500 to 600 tons of stable manure is brought back from Liverpool by carts after delivering produce.

The tenant has the game, and keeps a fair head of all kinds.

The buildings are well kept, and are pretty well suited to the farm.

Implements.—Farm carriages are good and well cared for. A useful assortment for the cultivation of the land, including American ploughs, of which the tenant highly approves. A small 2-horse power engine drives the chaff-cutter.

Labour employed consists of three sons of the tenant, who act as teamsmen, and two other men, who receive 19s. a-week, with house and garden.

The system of farming is to sell everything into Liverpool, and load back with manure, with the exception of that which is consumed by stock at home. And it is possible that here again horned stock are, to put it plainly, more bother than they are worth; however, they do not prevent the vast majority of the total produce going away, and that this realised a very handsome sum we saw no reason to doubt.

The clover leas were especially good, and the farming generally was excellent.

On inspecting the crops we found—

Four acres of black oats after wheat sown with seeds to the north of the strip of marsh land, an uneven, very indifferent crop, rather late, with some good spots.

Sixteen acres of second-year's lea, after barley, was in excellent order, a good crop, wanting cutting.

Sixteen acres of first-year seeds, a most admirable plant in April, and in July had cut a very heavy crop of hay.

The seeds sown by Mr. Turton are, 10 lbs. of clovers, consisting of 4 lbs. of red clover, 5 lbs. of cow-grass, and 1 lb. of mixed alsike, white, and trefoil, with $\frac{1}{2}$ bushel of Italian, and $\frac{1}{2}$ bushel of perennial rye-grass to the acre.

Twelve acres of four years' lea had been cut for hay and stacked; the bottom was close and even, but it had rather a "hide-bound" appearance, and seemed to want breaking up.

Four acres in the same field, in April, was being ploughed for turnips, rather too wet; and in July the part in swedes, sown early, seemed to have gone in raw, and cloddy, and had suffered very much from fly; the part in tares was a pretty good crop, clean, but uneven. The boundary fence here belonged to the tenant, and it was the only bad one on the farm.

Sixteen acres, fallowed after two years' lea, all for potatoes, part set in April, in July was a magnificent crop; we saw nothing better anywhere, a few mangolds in this field were only a middling plant. The whole field was clean.

Sixteen acres of white winter wheat. This is only the third year the tenant has had this field, and when he took it, it was foul and in bad order. He took turnips the first year, and potatoes the next; and after that the present crop, which looks very promising and clean, and like yielding $5\frac{1}{2}$ quarters.

Ten acres of third year seeds were good.

Ten acres of white Poland oats after wheat. This was a first-rate crop, and promised a heavy yield: the young seeds also looked healthy and well. Altogether a satisfactory field to finish up with.

The tenant has a permanent cutting, about 4 feet wide, about 2 deep, and a great length, drained at the bottom, where he always stores his potatoes.

The fruit and vegetable garden is thoroughly well done, and brings in a good round sum of money; 140 dozen quarts of fruit had been sold out of it; and the trees, planted by the tenant, were covered with fruit. Taking it altogether, Burnt Mill Farm is one that Mr. Turton has a right to be proud of.

CLASS I.—COMMENDED.

Mr. Mark Wright, Gill Moss Farm, Croxteth, Liverpool.

		A.	R.	P.
Arable	.. .. .	218	0	30
Grass	.. .. .	3	3	10
Total		222	0	0

This farm is the property of Lord Sefton. It is hired on a yearly agreement, which binds him very tight, and keeps the tenant from deriving benefit from the Agricultural Holdings Act of 1875. The rent appears to have been raised since 1866 at different times. There is no security for permanent improvements other than that provided by the Act of 1883. Ten years ago the premises were struck by lightning and burnt down; and when rebuilt at a cost of about 2000*l.*, the tenant had to pay an increased rent of 98*l.* 10*s.*; and though at the same time a piece of land of 8 acres was added to the farm, this was in such a bad state, and required so much doing to it, that it was hardly worth having.

The tenant pays 2*l.* 10*s.* annual insurances on the buildings, and is not allowed land tax after paying it. The rent and tithe amount to 492*l.* 18*s.*

The soil varies very much, from good heavy loam to worthless sand and clay, and the season has evidently been unfavourable for it. The greater portion is free working, and in a high state of fertility, producing a large bulk of hay, straw, green food, potatoes, and corn, and this nearly all goes to Liverpool, distant 6 miles, and more than an equivalent in plant food, viz. horse- and cow-manure is loaded back.

The farm is heavily stocked with ground and other game, and sustains considerable damage.

The system of farming is almost identical with that pursued on the First-Prize Farm in this Class, as will be seen from the list of live-stock.

- 7 Carthorses, good.
- 1 3-year-old filly.
- 1 Pony.
- 2 Milking cows. } Poor.
- 3 Calves. }
- 9 Fat pigs.

Selling everything, and bringing manure back, is a principle rigidly adhered to.

Hay is a very good crop, and well made, and the same may be said of last year's crop. In July, three large stacks of about 60 tons each had been well won, and stacked with an elevator.

Two Dutch barns in November were filled with oats and wheat. These commodious structures were erected by the tenant at a cost of 200*l*.

The new steading is convenient, and of ample size. The house and garden are also good, and kept up to perfection.

Implements.—A seven or eight horse-power steam-engine chaffs, crushes, and steams, the machinery having been all put up by the tenant; 5 good waggons and 8 good carts, and an elevator for stacking, and all other necessary tools, in good order.

Labour.—

3 Regular carters,	at 20 <i>s</i> .	a week.
1 Labourer	„	21 <i>s</i> .
2 Irishmen	„	18 <i>s</i> .

Extra labour is supplied by Irishmen in summer.

The garden, well laid out, and kept up to the utmost pitch of profitable productiveness, is a pleasure to see, and leaves nothing to be desired; and a handsome, though not large conservatory, contained such a dazzling blaze of colour in April, as we imagine few florists could rival, and such as the humble writer of this Report had never seen before. Not a flower, or a twig, or a leaf, in Mr. Wright's conservatory, but appeared to enjoy the most robust health; and I need hardly say that their owner regards them with something more than sentimental interest, as cut flowers command a very good price in Liverpool; and the whole garden pays it way.

If this farm had been more like the garden as regards cleanliness, it would undoubtedly have taken higher rank in this Competition.

Crops were as follows:—

Sixteen acres of potatoes after 6 years' lea, black sandy loam resting on sand. This was a fair good crop, but very dirty; a portion grown from apples, for new varieties, was very patchy. Fifteen acres potatoes, after oats, and well mucked, was also full of couch and annuals. Both these pieces of potatoes were the worst we saw.

Six acres white oats after 3 years' lea; joins a game covert; a very middling crop, and much damaged by game.

Twenty-four acres first year's seeds, after wheat, has been top-dressed with rock salt; looked well in April, and a fair crop of hay was partly carried in July; the work progressing in a business-like manner.

Twenty-nine acres of oats, partly Black Tartar, and the remainder Yellow Poland. The former, on the worst land, were very inferior and dirty; the latter were a fair good crop, and cleaner. The tenant has known these oats, when threshed, to run from the spout at the rate of one sack in three minutes.

Twenty-three acres of winter wheat. An uneven crop, good in places, full of black heads, thin in furrows and in patches; not quite clean, a good "take" of seeds; on the whole, an average crop.

Twenty-four acres of first year's seeds (American red clover, which the tenant likes better than English), cleared of a good crop of hay; a strong good root left.

Twenty-five acres of Hunter's wheat, late sown. A most irregular field, both in shape, soil, and crop, varying from places where there was absolutely neither soil nor crop (part of the land recently thrown on to the farm), to the narrow strip running towards the homestead, where was standing one of the stoutest and best crops of wheat we met with. The average produce of this field it would be impossible to estimate.

Seventeen acres of potatoes. The best part of these equalled anything we met with of the kind, both in promise and in good cultivation; 20 drills of good swedes were badly singled.

Fourteen acres of second-year's seeds, twice mown the first year, were a very thick good root, top-dressed with rock-salt, $3\frac{1}{2}$ cwt. (at 9s. 9d. a ton) to the acre. This field did the tenant great credit.

The whole farm has been drained 6 yards apart, 3 feet deep; the landlord found tiles and the tenant the labour. If it had to be done again, he would drain 5 yards apart and 30 inches deep. The tenant has at his own expense done a great deal of heavy work in pulling out old fences, levelling old pits, &c., and the excellent manner in which the farm is now laid out deserves great praise.

CLASS II.—FIRST PRIZE, £30.

Mr. John Cropper, Moss-side, Maghull, Liverpool.

Arable	..	..	..	48	acres
Grass	..	..	..	2	„
Total	..	..	..	50	„

This compact little farm, the property of Edmund Molyneux, Esq., is held on a lease which has not been renewed since 1851. There are no restrictions, and the tenant is not under the Agricultural Holdings Act of 1875.

Besides these 50 acres, Mr. Cropper occupies 92 acres which are not for competition.

The soil is light loam, sandy, and shallow in some places, resting on clay.

The tenant has lived here 38 years. His system of farming is to sell everything possible at Liverpool, and load back with town manure; night-soil, also, and shoddy are purchased in considerable quantities, and brought by rail to the station, $1\frac{1}{2}$ miles distant. Rent, 120*l.*; and tithe, 8*l.*

The homestead, house, garden, and premises generally were neat and orderly; and the gates, occupation roads, and especially fences, were remarkably good, with the exception of a boundary fence, which was not up to the mark. The tenant planted all the fences, the landlord finding quicks; the draining also, wherever necessary, was done by himself, the landlord finding tiles. Several roads have been made and pits filled up, and old fences pulled out. The land is very clean, and in a high state of fertility.

Labour.—The farm is worked by the tenant and his two sons, two teamsmen, and a labourer, besides extra labour when required.

Live-stock were as follows:—

- | | |
|--|--------------------|
| 3 Carthorses (the best we saw anywhere). | |
| 1 Light horse for general purposes. | |
| 1 Chestnut blood filly. | |
| 3 Cows. | } All first class. |
| 3 Heifers. | |
| 3 Calves. | |
| 4 Fat pigs. | |

The horses call for some further remark. The two best, one 5 and the other 6 years old, cost the tenant 70*l.* and 77*l.* apiece, respectively; and that good horses are required is sufficiently proved by the fact that 1 horse sometimes takes a load of 3 tons to Liverpool; and as everything is weighed as a rule, there is no guess-work about the load. Liverpool is $8\frac{1}{2}$ miles to the south. The dairy produce is nearly all consumed at home. Nitrate of soda is used as a top-dressing.

Crops.—The small grass croft next to the steading was not very first-rate grass, and the temporary fence wanted a gate.

A small plot of mangolds in the stackyard enclosure was fairly good, but attacked by maggot.

A large plot of rhubarb was very good.

Four acres of potatoes, after one year's seeds, on the north-

eastern side of the steading, were not quite even, and the blanks were thought to be the effect of wireworm ; the land was good, as well as clean and well cultivated.

Seven acres of winter wheat after potatoes in one part of the field, and after spring-cabbages, followed by potatoes, on the remainder ; the first portion was the best crop, next the road ; but the whole was good, the straw strong and the heads clean, and would cut early.

Seven acres of Webb's White Short oats, joining the last field on the south, after wheat, and sown with seeds, which were well up in April. This crop was a little short in the straw on the north side of the field, but the remainder was a remarkably good clean crop.

Nine-acre field was cropped in three equal portions. Winter wheat, in two plots of 3 acres each, was a very good clean crop. One of these plots last year rendered a good account of itself, by growing a very valuable crop of early cabbage, which was sold off in time to make room for a crop of Leighton potatoes, which averaged 14 tons to the acre, and the produce was sold for seed at a very high price. The remainder, potatoes after two crops of cabbage last year, was very good and clean, but showed some blanks.

Eight acres of very good first year's seeds, after wheat. In July, a heavy crop of hay had been carted.

Four acres second year's seeds after wheat were very good. The hay had been carried, and the land already ploughed for cabbage in July, and partly drilled up and mucked.

One-and-a-half acres of winter wheat, after potatoes ; a very good clean crop.

Grass seeds sown : red clover, cow grass, and alsike, in equal quantities, 10 lbs. ; and 1 bushel of rye-grass, half Italian and half perennial, mixed at home.

The large garden is made the most of, and must be a large source of profit.

Mr. Cropper appears to be fortunate in having two sons, as steady and industrious as himself, and taking a pride in every detail of the management of this farm, which, in its turn, does them every credit.

CLASS II.—SECOND PRIZE, £15.

Mr. Richard Brade, Banks, Southport.

						A.	R.	P.
Arable	..	..	..	..	..	71	2	8
Grass	..	..	..	..	..	19	0	0
Total						90	2	8

This farm lies on the coast, which is here very flat ; the land is very little above the sea-level, and there is an embankment which forms its north-western boundary, over which the sea occasionally washes. The whole character of this coast is flat fen land, and almost the only fences are water-ditches of about five feet in width and four deep.

The land is held under trustees of the late C. Scarisbrick, Esq., on yearly agreement, at a rent of 190*l.*, and tithe, 17*l.* There are no restrictions as to cultivation. The tenant has held the farm for 34 years, and, without any offence, we may say that it apparently agrees with him ; and Mrs. Brade, his wife, was born here.

The farm buildings are new, convenient, and sufficient ; there is a very good byre for 16 cows, and good stables and outhouses.

The farm lies 5 miles N.E. of Southport, and about 14 S.W. of Preston.

Live-Stock, an important item on this farm, is as follows :—

Horses .. 1 Shire mare, with colt foal, by “ Adam,” 6 years old.
 1 Black Shire mare, 11 years old.
 1 Grey gelding, 5 years old.
 1 Black pony, for the milk cart.
 1 Useful bay gelding, rising three years.
 1 Roan entire colt, rising two years.
 1 Chestnut yearling filly.

All the above are very good, especially the brood mare which was entered for the Preston Show.

Cattle—16 Half-bred Shorthorn cows.

These were a remarkably good lot, and in very high condition ; they were bought just ready to calve, and the calves are sold as soon as they are born, at about 2*l.* a-head.

No bull is used ; the cows are milked and fed off.

Milk is retailed in Southport twice a-day for three summer months at 2½*d.* a quart, and for nine months 2½*d.* a quart ; and on an average brings in about 10*l.* a-week.

No kind of cake is ever used ; the cows are fed in winter on 7 lbs. of maize-meal a-day, grains from a whiskey-distillery, costing 8d. per bushel, sliced turnips, and long hay. Hay-chaff is mixed with the other food.

Pigs (of the Middle breed) :—

3 Good breeding sows.

5 Fat pigs.

9 Store pigs.

About 100 hens are kept, no particular sort, all good layers. Eggs and chickens are sold.

Implements and carriages, &c., are all in excellent condition ; they are of the most modern and approved kind, and all are well painted.

The grinding-mill and chaff-cutter in the barn are driven by a threshing traction-engine when at home, but, as it is hired out, this is not always at hand.

The threshing-machine is travelled by one of the tenant's sons, and earns about 200*l.* a year.

Labour.—All the work is done by the tenant, his two sons, and two servant-lads, who live in the house, and get 18*l.* and 20*l.* respectively ; also a labourer, who gets 10*s.* a week and his board. Extra labour is hired at potato and harvest time.

Manure.—Artificial manure is not much used. About 200 tons of muck is carted from Preston by return-carts when delivering produce. In October 1883, 8 acres were boned, at the rate of 10 cwt. per acre, costing 8*l.* 10*s.* per ton.

Sixty acres of the land has been drained 3 feet deep, the landlord finding tiles, and the tenant doing the labour.

Crops.—A spare space in the large stackyard is turned to good account with a cabbage-crop.

Nineteen acres of winter wheat, after potatoes, on moss-land, a level moderate crop ; a good many annuals rather choke it at the bottom ; this land is for beans next year.

Eight acres of good potatoes, not quite clean, fairly well cultivated, narrow headlands, the edge of the boundary-ditch set with cabbage all round the field ; a thrifty plan, common in this district : these were doing well.

Fourteen acres: 10 potatoes, 2 swedes, and 2 mangolds thinned. These were suffering for want of singling.

Three acres of Golden Drop Wheat, poor small heads.

Three acres of the same ; a fair good crop, next the house.

Four acres of potatoes after wheat ; a very good crop.

One acre Myatt's Kidneys, injured by frost.

The tenant and his family are all doing the best they can for

the farm, and though the land cannot be called first class, it responds fairly well to their good management.

There are 30 acres of outlying land of very poor quality. Eight acres of oats was a poor crop. Fourteen acres of second-year's seeds cleared of hay had a good bottom, and looked wonderfully well; and the same may be said of 8 acres of first-year's seeds.

CLASS II.—HIGHLY COMMENDED.

Mr. Hugh Ainscough, Banks, Southport.

Arable	46 acres.
Grass	6 „
Total	52 „

This farm is held on a yearly tenancy, and is on the same estate as Mr. Brade's, which it joins; it is the same class of peat-land. Mr. Ainscough won the First Prize of the Royal Agricultural Society of England for Small Farms in 1877.

The present tenant has been here for 36 years, and is under no restrictions as to cultivation. Rent, 126*l.*; tithe, 9*l.*

Live-stock.—

3 Carthorses.

1 „ colt, rising 3 years.

Cattle .. 12 cows.

Pigs .. 32, in different stages of fattening.

The cows are a very good class. Hitherto they have not been put to the bull, but milked and fatted. For the future, however, the tenant intends to bull the best cows, and to put them out to keep until down calving. All the milk is sold in Southport, twice a day, at 2½*d.* per quart for the three summer months, and at 2½*d.* for the other nine months.

Mr. Ainscough remarked: "If I bring a cow back from the market without a good bag, it is like going to pay my rent without my purse." The cows are fed on Indian meal, grains, and bran, and sometimes cut chaff and long hay, according to the season, and the time the roots last, and all looked like paying their share of rent.

The pigs are a good lot, mostly fat; they are fed on refuse biscuits, costing 6*s.* for 240 lbs., Indian meal, and potatoes. Pork is selling at 5½*d.* per lb. The tenant thinks this a good trade.

Labour.—Three men board in the house, and two sleep there;

2 Q 2

one of these is a son of the tenant. They are paid 9s. a week, besides board.

The buildings are old and dilapidated; the byre floors were very bad, and in holes, standing full of stagnant filth; the premises and stackyard also were untidy.

Crops.—

13	acres	winter wheat.
14	„	potatoes and turnips.
11	„	seeds, 1st year.
8	„	„ more than 1 year.

Some of these crops were very good, especially the Waterloo wheat. The potatoes were mostly a good crop, but partly infested with twitch, and the seeds were very good; the mixture used by Mr. Ainscough is—

Red clover, 10 lbs.,
Italian rye-grass, 1 bushel, or rather less, per acre.

The potatoes, besides a heavy mucking, get 2 cwt. of Vicker's bag manure.

The seeds are top-dressed with grass manure.

CLASS II.—COMMENDED.

Mr. John Whalley, Rainford, St. Helen's.

Arable, 84 acres (including garden).

This farm is the property of Lord Derby, and is held from year to year without restrictions. The landlord does all repairs.

The tenant has lived here 7 years, and his father and grandfather before him.

The rent is 92*l.*, and tithe, 8*l.*; this must be considered reasonable.

The soil is light, chiefly black sand, and running to moss.

The horses are a useful lot, and all bred on the farm; they consist of—

4	Carthorses
1	„ (two-year-old).
1	„ (foal).

The cattle are well cared for, and fairly good.

3	Cows in milk.
4	Heifers in calf.
3	Under two-year-old.

The pigs are—

4 Fat.

1 Brood sow, with litter of 10.

No sheep.

The land lies $4\frac{1}{2}$ miles N.W. of St. Helen's, and about 12 or 14 miles N.E. of Liverpool.

The buildings are indifferent, but orderly and clean. There is a very good Dutch barn built by the tenant, 13 yards long by 10 yards wide; it cost 45*l*.

Implements.—Small steam-engine for pulping, churning, and steaming, and a fair assortment of those field implements required on a farm of this size; the carts were in good order.

System of cropping :—

1. Potatoes.

2. Wheat, oats, or barley.

3. Potatoes.

4. Corn crop sown down for two years.

Horse-manure and cow-manure are brought from Liverpool, about 300 tons annually; each costs 6*s*. by road, 8*s*. by rail. Nitrate of soda and bone-meal are used for top dressing.

The land is very clean and well cultivated.

Fences are good; the stackyard in November was well filled and tidy.

Hay and straw are sold at St. Helen's and in Liverpool.

There is a large head of game on this farm.

Crops.—12 acres potatoes, and $1\frac{1}{2}$ acres of mangolds and swedes; a good crop, clean and well cultivated. We saw nothing much better. Mangolds pretty good, swedes good.

Ten acres of second-year seeds, top-dressed, after barley; may cut a light crop of hay of fair quality, not over 25 cwt. an acre.

An admirable fence divided this field from the next; all the fences were planted by the tenant's father.

Ten acres of Chevalier barley after potatoes, sown with seeds; the greater part of this field next the road was the best crop of barley that we came across; the top end was lighter, but good on an average.

Twelve acres of potato oats, after two years' seeds; mowed both years; a very good crop. A large bed of coltsfoot is next the road.

Twelve acres of wheat after potatoes; a downright bad crop and poor land.

Twelve acres of potatoes after oats. These had much improved in July, and were quite as good as could be expected;

the land is pure peat; 4 feet of the surface has been cut and removed for peat.

The tenant used to purchase lime, but has given it up.

Nine acres of first-year's seeds were cleared of hay, and a good strong root left.

A bad boundary fence here belongs to the tenant.

We consider that Mr. Whalley manages this farm of very moderate land with great skill and in a business-like manner.

This concludes what we trust is a faithful Report of the inspection of Classes I. and II; and though there may be a good deal of dry monotony in the reading, yet in the actual task of inspection, I may say that it was found to be one of instructive and pleasurable interest.

XXIV.—*On the Valuation of Unexhausted Manures.* By Sir JOHN BENNET LAWES, Bart., LL.D., F.R.S., and J. H. GILBERT, LL.D., Ph.D., F.R.S.

WE have been requested by the Chemical Committee of the Royal Agricultural Society to draw up a Table of the composition and value of the manure obtained by the consumption of the food-stuffs in ordinary use on the farm. About twenty-five years ago we published a Table showing the average composition, per cent., and per ton, of the chief feeding-stuffs, and other agricultural products; and we called attention to the fact that there must be great difference in the value of the manure according to the composition of the food consumed. Soon afterwards, a Table was published showing the estimated money-value of the manure from the consumption of one ton of the various foods.

The Table of composition was founded partly on the results of analyses made at Rothamsted, but in great part on the results of others which had at that time been published; and having calculated the amounts of nitrogen, phosphoric acid, and potash, contained in one ton of the respective foods, we deducted the quantities of phosphoric acid and potash which we estimated would be contained in the increase in live-weight of the animal consuming it. But, in the case of the nitrogen, we deducted 10 per cent. from the amounts in a ton of the cakes and leguminous seeds, which contain high percentages of nitrogen, and 15 per cent. from the amounts in the foods which contain lower percentages of nitrogen. These amounts of nitrogen deducted, were reckoned to include, besides the nitrogen actually stored up in the increase in live-weight, some loss, but not

to cover the losses that take place in the manure after it is voided by the animal. The nitrogen and phosphoric acid in the manure, as so calculated, were then valued at the prices at which they could be purchased in Peruvian guano, and the potash at its market price at the time. The total manure-value of a ton of each food, as so arrived at, was published, but the data were not given.

Objections have, from time to time, been raised against the manure-values given in that Table. At the date of its publication, compensation for unexhausted manure was not the law of the land; and whatever opinions may be held as to the amount of the valuation in any particular case, or as to the valuations as a whole, there can be no doubt that the discussion of the subject has led to the general recognition of the fact that cattle-foods vary very greatly in their manure-value. So far a very important step has been gained.

Fifteen years elapsed before the Duke of Richmond carried through Parliament (in 1875) "The Agricultural Holdings Act" for the compensation to the tenant, for his unexhausted improvements. This Bill proved, however, to be practically inoperative, as its provisions were not compulsory.

At a meeting of the Council of the Royal Agricultural Society, held on November 3rd, 1875, the following resolution was adopted, on the motion of Mr. Randell:—

"That while under any circumstances it would be of the greatest importance to the members of the Society to prove by a series of experiments made under every variety of soil and climate how far the accuracy of 'The estimated value of manure obtained by the consumption of different articles of food,' as given by Mr. Lawes in his valuable contribution to the last Spring number of the 'Journal' of the Society, is confirmed by practical results, it becomes more especially important now that compensation to outgoing tenants for the unexhausted value of purchased food will become subject to arbitration.

"That it be referred to the Chemical Committee to consider in what way experiments may be conducted by practical farmers in different districts to demonstrate by this union of 'Practice with Science,' the actual manure-value of the kinds of food most extensively purchased—say the first four articles in Mr. Lawes' Table, with any others the Committee may select—the feeding value of each being also recorded."

At the meeting of the Council, held on February 2nd, 1876, the Chemical Committee reported with reference to the foregoing resolution as follows:—

"That, recognising the very great importance of the question submitted to them, they recommended the Council to extend

the reference, so as to enable the Committee to obtain the opinion of practical and scientific witnesses as to how far the knowledge we already possess of the fertilising properties of manures and feeding-stuffs, especially the latter, can be relied upon as a basis of valuation to be made under the compensation-clauses of the Agricultural Holdings Act; and, in the event of those witnesses considering our present knowledge on these subjects insufficient, as to the expediency of making experiments with those objects in view."

During the next four weeks the Chemical Committee examined a number of witnesses, and, at the close of the evidence, reported as follows:—

"The Committee have to report that they have fully considered the evidence taken by them on the subjects connected with Mr. Randell's motion.

"They find in the case of nearly all the witnesses examined a very decided opinion in favour of experiments to determine the manurial and feeding-value of cakes and other feeding-stuffs.

"It seems to the Committee that the primary condition of any experiments to be conducted under the auspices of the Royal Agricultural Society should be that of their being thoroughly reliable, and of their results adding to the amount of knowledge previously existing on the subject-matter of the experiments.

"While some of the witnesses appear to see no difficulty in carrying out practical experiments of the kind indicated by Mr. Randell, the strongest possible opinions were expressed by the scientific witnesses that, although some special information of local interest might be obtained from them, they would be, in the words of one of the witnesses, 'of no use whatever for establishing anything like a scientific basis or principle, which is so much needed when a general question, such as that of manure-value, comes into play.'

"But the difficulties and doubts as to the possibility of these experiments being carried out in a trustworthy manner are not confined to scientific witnesses. They are pointed out in the strongest manner by some of those most in favour of these so-called practical experiments, one of whom, indeed, suggests their being instituted at places like the Universities, Kew, or Cirencester, adding that he does not know a single person in the three counties with which he is connected to whom he could entrust them. Another witness considers they ought to be under the direction of the Society's Chemist and the Chemical Committee; while it was generally assumed that those who might be willing to undertake the experiments should be compensated for their trouble and expense.

“The question of expense is one which the Committee are confident the Council would consider of comparatively little consequence, if adequate results were to be expected; but although fully appreciating the object of Mr. Randell's motion, and the great importance—especially with reference to valuations under the Agricultural Holdings Act—of adding to our knowledge of the value of artificial manures and feeding-stuffs, they feel they would only be justified in recommending experiments, the results obtained from which would be held, by a general concurrence of opinion, scientific and practical, to be thoroughly exhaustive and worthy of confidence.

“An opportunity for carrying out experiments has been offered to the Society by the Duke of Bedford, and the Committee now recommend that Mr. Lawes and Dr. Voelcker be requested to draw up a scheme for carrying on at Woburn such experiments as they, in communication with the Chemical Committee, may determine on, it being understood that the experiments, when decided upon, shall be wholly under the control of one or both of these gentlemen.

“Although not prepared at present to propose—as being instituted under the auspices of the Society—any other experiments than such as may be determined on under the above recommendation, the Committee are far from wishing to discourage experiments independently conducted by practical farmers, but, on the contrary, would be glad to assist them. Dr. Voelcker expresses himself as anxious that such experiments should be made, and gives instances of some that might furnish useful information. It is therefore suggested that it may be of advantage if Dr. Voelcker be requested to draw up the plan of one or more of such practical experiments as he thinks might bear instructive results, laying down for the guidance of such farmers as might like to try them the necessary instructions and rules for conducting them.

“With regard to the great advantage which, by the evidence of all the witnesses, there would be in the establishment of some one scale of valuation of unexhausted manures, which would be recognised and adopted generally in the country, the Committee found that none of the witnesses were unfavourable to Mr. Lawes' Tables of manure-value, if confirmed by direct experiment. One, indeed, of the most important witnesses expresses his own reliance altogether on it as it stands; while another says he should, in any case where there was no agreement, most certainly adopt Mr. Lawes' Table, modified by his own experience, and by considerations as to climate and soil.

“Inasmuch, however, as the evidence clearly shows that experiments instituted for the purpose, as suggested by

Mr. Randell's motion, of corroborating or modifying Mr. Lawes' conclusions as to the manurial value of cakes and feeding-stuffs should be carried on for several years, it appears to the Committee that, pending the completion of such experiments—should they be carried out—it is desirable for the Society to draw up and publish, with the assistance of Mr. Lawes and Dr. Voelcker, a schedule of the manurial value of these substances, based upon Mr. Lawes' Tables, and on any other evidence that may come under their consideration."

The liberal offer of the Duke of Bedford, referred to in the above report, to furnish the necessary land, and the funds required to carry out an investigation in regard to the manure-value of consumed cattle-foods, and other points, having been accepted, a series of experiments was at once arranged, and commenced as soon as possible, and they are still in progress. It would not be appropriate on the present occasion to enter into the consideration of the important additions to our knowledge which have accrued from those experiments. Nor need we here refer to the fact that the manure from cattle-foods of such widely different manure-value as decorticated cotton-cake and maize should have shown very little difference in the crops to which they were applied, any further than to say that the result was doubtless due to the condition of the land being, in both cases, high enough to yield approximately maximum crops.

It is doubtless the certainty that the Duke of Richmond's Act would be followed by one securing to the tenant compensation for his unexhausted improvements, that has led the cultivators of the soil to pay much more attention in recent years to the comparative value of the manure from the consumption of different descriptions of cattle-food; and it is remarkable that, coincidentally with the results obtained at Woburn, which do not establish the superiority of the manure from decorticated cotton-cake over that from maize, it has become almost universally recognised by farmers that the manure from the consumption of the cakes in ordinary use has a higher value than that from the cereal grains.

It is true that when Chambers of Agriculture, or Farmers' Clubs, have agreed upon a basis for compensation in amicable arrangements, they have generally preferred to fix the scale in proportion to the cost of the food, rather than to its manure-value. They have, however, in the case of cakes, and even of the leguminous seeds, assigned a larger proportion of their cost as compensation than in that of the cereal grains. Thus, the fact that foods rich in nitrogen yield manures of higher value than those which are poor in that substance, is fully recognised.

A great advance has thus been made; and in discussing the question of the *unexhausted residue of manures*, upon which we now propose to enter, it is a great advantage to know that agriculturists are ready to accept it as an established fact that the chemical composition of a food affords a true indication of its manure-value. Further evidence of improved knowledge is to be found in the fact that the relative market prices of different cattle-foods gradually approximate more nearly to what may be called their relative scientific values—that is, their values taking into account both their feeding- and their manure-value. For example, ten years ago the price of linseed-cake ranged from 12*l.* to 14*l.* per ton, whilst decorticated cotton-cake was hardly saleable at half the price; linseed-cake being more valued as food, and the greater manure-value of cotton-cake not being recognised. Now, however, the relative market prices of the two foods much more nearly represent their true relative values, taking both their food and their manure values into account.

The discussions which have taken place in connection with, and subsequent to, the passing of the "Agricultural Holdings Act of 1883," which gives to the tenant the right of property in his *unexhausted manures*, have afforded the means of ascertaining the general views of agriculturists on the subject; and although some exaggerated opinions have been put forward, common-sense views have, upon the whole, prevailed; and we are encouraged to believe that any carefully considered contribution to the solution of this most complicated and difficult question will be favourably received, and will not be without practical value.

The existence of *unexhausted fertility*, resulting from the consumption of cattle-foods, depends upon the fact that when organic matter, animal or vegetable, is applied to the soil as manure, its complete decay, and the complete liberation of its fertilising constituents, extend over a considerable period of time. Poor land cannot be suddenly brought into "*condition*" by the consumption on the farm of purchased foods. Nor can "*condition*," that is accumulated fertility, be at once withdrawn by suddenly stopping the use of the foods.

The Rothamsted field experiments afford numerous illustrations of such gradual accumulation, and only gradual exhaustion. It may take a great many years of unmanured cropping to exhaust the accumulation from a few years' application of dung, and to bring the land back to its original state. Even when rape-cake is applied for the continuous growth of corn-crops, a considerable *unexhausted residue* remains in the soil. The fact that such accumulation does take place cannot be disputed.

But when we come to consider—of what the accumulation consists, what is its amount, and what its money-value, the real difficulties of the problem to be solved become apparent.

Each individual food, when judiciously used in conjunction with others, contributes more or less to the increase of the animal consuming it; and the increase will carry away a certain amount of the constituents of the food. The remainder, which constitute the manure, will in the first place increase the produce of the crops to which it is applied; but it will also leave an unexhausted residue, the amount, and the money-value of which to the succeeding tenant, we have to endeavour to determine.

We must, then, in the first place, form an estimate of the amount of increase in live-weight of animals which a given quantity of each food will produce, and of the amount of manure-constituents which that increase will take from the food. Next, we must endeavour to estimate the increase in the crops, and the amount of constituents so removed. Lastly, the amount, and the value, of the manure-residue has to be estimated. This we have done in the case of a number of the foods, the composition, the original manure-value, and the unexhausted manure-value of which, are given in the Tables which follow. We have then decided upon a scale of reduction of the unexhausted manure-value from year to year, and in this way arrived at an estimate of the money-value of the residue accumulated over a period of eight years. Finally, having thus come to a conclusion as to the amount of what may be called the *compensation-value* of the accumulated residue, we have devised a simple method of calculation, starting from the *total, or original manure-value* of the various foods; that is, from the value deducting the constituents in the increase in live-weight only.

I. AVERAGE COMPOSITION OF CATTLE FOODS.

The first Table we have to call attention to shows the average composition, per cent. and per ton, of thirty-six different foods, so far as this is necessary for the purpose of manure-value calculations; that is, it gives the amount *per cent.* of dry matter, nitrogen, total mineral matter (ash), phosphoric acid, and potash, and the amounts *per ton* of the foods, of nitrogen, phosphoric acid, and potash. In some cases the figures are the same as in our original Table, published about twenty-five years ago, but in all cases more recent analyses have been had recourse to, and alterations have been made if it seemed desirable.

TABLE I.—AVERAGE COMPOSITION, PER CENT. and PER TON, of CATTLE-FOODS.

Foods.	PER CENT.					PER TON.		
	Dry Matter.	Nitrogen.	Mineral Matter (Ash).	Phosphoric Acid.	Potash.	Nitrogen.	Phosphoric Acid.	Potash.
	per cent.	per cent.	per cent.	per cent.	per cent.	lbs.	lbs.	lbs.
1. Linseed	90·00	3·60	4·00	1·54	1·37	80·64	34·50	30·69
2. Linseed-cake ..	88·50	4·75	6·50	2·00	1·40	106·40	44·80	31·36
3. Decorticated cotton-cake ..	90·00	6·60	7·00	3·10	2·00	147·84	69·44	44·80
4. Palm-nut cake ..	91·00	2·50	3·60	1·20	0·50	56·00	26·88	11·20
5. Undecorticated cotton-cake ..	87·00	3·75	6·00	2·00	2·00	84·00	44·80	44·80
6. Cocoa-nut cake ..	90·00	3·40	6·00	1·40	2·00	76·16	31·36	44·80
7. Rape-cake ..	89·00	4·90	7·50	2·50	1·50	109·76	56·00	33·60
8. Peas	85·00	3·60	2·50	0·85	0·96	80·64	19·04	21·50
9. Beans	85·00	4·00	3·00	1·10	1·30	89·60	24·64	29·12
10. Lentils	88·00	4·20	4·00	0·75	0·70	94·08	16·80	15·68
11. Tares (seed) ..	84·00	4·20	2·50	0·80	0·80	94·08	17·92	17·92
12. Indian corn ..	88·00	1·70	1·40	0·60	0·37	38·08	13·44	8·29
13. Wheat	85·00	1·80	1·70	0·85	0·53	40·32	19·04	11·87
14. Malt	94·00	1·70	2·50	0·80	0·50	38·08	17·92	11·20
15. Barley	84·00	1·65	2·20	0·75	0·55	36·96	16·80	12·32
16. Oats	86·00	2·00	2·80	0·60	0·50	44·80	13·44	11·20
17. Rice meal* ..	90·00	1·90	7·50	(0·60)	(0·37)	42·56	(13·44)	(8·29)
18. Locust beans*	85·00	1·20	2·50	..	..	26·88	..	..
19. Malt coombs ..	90·00	3·90	8·00	2·00	2·00	87·36	44·80	44·80
20. Fine pollard ..	86·00	2·45	5·50	2·90	1·46	54·88	64·96	32·70
21. Coarse pollard..	86·00	2·50	6·40	3·50	1·50	56·00	78·40	33·60
22. Bran	86·00	2·50	6·50	3·60	1·45	56·00	80·64	32·48
23. Clover hay ..	83·00	2·40	7·00	0·57	1·50	53·76	12·77	33·60
24. Meadow hay ..	84·00	1·50	6·50	0·40	1·60	33·60	8·96	35·84
25. Pea straw ..	82·50	1·00	5·50	0·35	1·00	22·40	7·84	22·40
26. Oat straw ..	83·00	0·50	5·50	0·24	1·00	11·20	5·38	22·40
27. Wheat straw ..	84·00	0·45	5·00	0·24	0·80	10·08	5·38	17·92
28. Barley straw ..	85·00	0·40	4·50	0·18	1·00	8·96	4·03	22·40
29. Bean straw ..	82·50	0·90	5·00	0·30	1·00	20·16	6·72	22·40
30. Potatoes ..	25·00	0·25	1·00	0·15	0·55	5·60	3·36	12·32
31. Carrots ..	14·00	0·20	0·90	0·09	0·28	4·48	2·02	6·27
32. Parsnips ..	16·00	0·22	1·00	0·19	0·36	4·93	4·26	8·06
33. Swedish turnips	11·00	0·25	0·60	0·06	0·22	5·60	1·84	4·93
34. Mangel wurzels	12·50	0·22	1·00	0·07	0·40	4·93	1·57	8·96
35. Yellow turnips*	9·00	0·20	0·65	(0·06)	(0·22)	4·48	(1·34)	(4·93)
36. White turnips..	8·00	0·18	0·68	0·05	0·30	4·03	1·12	6·72

* In the case of neither Rice-meal, Locust-beans, nor Yellow Turnips, have records of ash-analyses been found. For Rice-meal the same percentages of phosphoric acid and potash as in Indian Corn, and for Yellow Turnips the same as in Swedes, are provisionally adopted; but in all the Tables the assumed results are given in parentheses. For Locust Beans no figure has been assumed, and the columns are left blank.

Although the figures given in the Table (I., p. 597) may be taken as fairly indicating the *average* composition of the different foods, yet it must be understood that in the case of almost every one of the articles in the list, individual samples may vary even considerably from the average. In the case of foods which are manufactured, or imported, the percentage of dry matter is usually high. In the case of those which may be either imported or home-grown, the variations in the percentage of dry matter in different samples may be comparatively wide; it being, as a rule, distinctly higher in the imported articles, which could not be shipped unless in a drier condition than is usual with the home-grown product. In such cases, therefore, the imported food will probably contain a higher, or the home-grown one a lower, percentage of dry matter, than the average amount given in the Table. Even in the case of professedly ripened products, such as cereal grains and leguminous seeds, the character of the season will materially influence their condition of dryness; and the same remark applies, in a greater or less degree, to such matters as hays and straws. Succulent matters again, such as roots, vary very considerably according to season, and to condition of maturity.

So far as individual constituents are concerned, very similar reservations must be made; and especially is this so in the case of the nitrogen. Even with professedly ripened products, the percentage of nitrogen may vary considerably according to soil, manuring, climate or season, &c., but especially according to season; and this is the case in a less degree with the phosphoric acid, and the potash, of such articles. But in the case of imperfectly ripened products, such as hay, and in a much greater degree in that of still less evenly matured and more succulent ones, such as roots, the percentage of nitrogen may vary very materially, and that of the phosphoric acid and potash to some extent.

Whilst, therefore, the figures given in the Table may be taken as representing the fairly average composition of the different foods, they must be adopted or modified with judgment, having regard to the influence of the conditions of growth, maturity, preparation, or preservation, to which they have been subject. Fortunately, however, unless the variation from the standard composition adopted in the Table be considerable, indeed more than is usual, the effect on the estimates of manure-value will not be material; but they will obviously be much greater in the case of the nitrogen, than in that of either the phosphoric acid or the potash.

Table II. (pp. 600-1), shows the method, and the results, of the calculation of the *total*, or *original manure-value* of the different foods, adopting as a basis their composition as given in Table I.

The first column of the Table (II.) shows the estimated amounts of each food required to give one part of fattening increase in live-weight of oxen or sheep ; and the second column shows the amounts of such increase that would, accordingly, be yielded by the consumption of one ton of each food. It is obvious that some estimate of this kind must be made before we can reckon how much of the manure-constituents of the food are carried off by the animal-increase, and consequently how much will remain for manure. These columns may, however, be very seriously misleading, unless their real meaning be understood. Thus, if given without further explanation, it might be concluded that, by the exclusive consumption by oxen or sheep, of one ton of any of the different foods, the amount of fattening increase given in the second column of the Table would be produced. In other words, that if so given, a ton of linseed-cake would yield 373 lbs., a ton of oat-straw 124 lbs., or a ton of swedes 20½ lbs. of increase. What is meant is, that when any one of the foods is given in the judicious amount, and admixture with other foods, which experience shows to be beneficial, it may be estimated that one ton of the food so consumed will, approximately, contribute the amount of increase in live-weight stated.

This will be better understood by giving some explanation of the way in which the figures have been arrived at. In the case of a few typical foods, a number of feeding experiments were selected in which the mixtures given were comparatively simple, and the results fairly average; and the productive effect of the particular food has been calculated, by eliminating that of the associated food, or foods, as determined in the case of other experiments, the results of which have been calculated in the same way. For example—the quantity of clover-chaff required to produce one of increase in various experiments was determined as follows:—

		Clover-chaff to 1 increase.
Oxen—with Linseed-cake, Barley, Swedes, and Clover-chaff ..		13·0
Oxen—	"	14·3
Sheep—with Linseed-cake, Swedes, and Clover-chaff ..		14·7
Sheep—with Barley, Swedes, and Clover-chaff ..		18·4
Sheep—	"	15·5
	Mean ..	14·2

TABLE II.—SHOWING the DATA, the METHOD, and the RESULTS, of the ESTIMATION

Nos.	DESCRIPTION OF FOOD.	NITROGEN.								
		Fattening Increase in Live-weight (Oxen or Sheep).		In Food.		In Fattening Increase (at 1·27 Per Cent.).		In Manure.		
		Food to 1 Increase.	Increase per Ton of Food.	Per Cent.	Per Ton.	From 1 Ton of Food.	Per Cent. of Total Consumed.	Total Remaining for Manure.	Nitrogen equal Ammonia.	Value of Ammonia at 6d. per lb.
			lbs.	per cent.	lbs.	lbs.	per cent.	lbs.	lbs.	£ s. d.
1	Linseed	5·0	448·0	3·60	80·64	5·69	7·06	74·95	91·0	2 5 6
2	Linseed-cake ..	6·0	378·3	4·75	106·40	4·74	4·45	101·66	123·4	3 1 8
3	Decorticated cotton-cake ..	6·5	344·6	6·60	147·84	4·38	2·96	143·46	174·2	4 7 1
4	Palm-nut cake	7·0	320·0	2·50	56·00	4·06	7·25	51·94	63·1	1 11 7
5	Undecorticated cotton-cake ..	8·0	280·0	3·75	84·00	3·56	4·24	80·44	97·7	2 8 10
6	Cocoa-nut cake	8·0	280·0	3·40	76·16	3·56	4·67	72·60	88·2	2 4 1
7	Rape-cake ..	(10)	(224)	4·90	109·76	2·84	2·59	106·92	129·8	3 4 11
8	Peas	7·0	320·0	3·60	80·64	4·06	5·03	76·58	93·0	2 6 6
9	Beans	7·0	320·0	4·00	89·60	4·06	4·53	85·54	103·9	2 11 11
10	Lentils	7·0	320·0	4·20	94·08	4·06	4·32	90·02	109·3	2 14 8
11	Tares (seed) ..	7·0	320·0	4·20	94·08	4·06	4·82	90·02	109·3	2 14 8
12	Indian corn ..	7·2	311·1	1·70	38·08	3·95	10·37	34·13	41·4	1 0 9
13	Wheat	7·2	311·1	1·80	40·32	3·95	9·80	36·37	44·2	1 2 1
14	Malt	7·0	320·0	1·70	38·08	4·06	10·66	34·02	41·3	1 0 8
15	Barley	7·2	311·1	1·65	36·96	3·95	10·69	33·01	40·1	1 0 1
16	Oats	7·5	298·7	2·00	44·80	3·79	8·46	41·01	49·8	1 4 11
17	Rice meal ..	7·5	298·7	1·90	42·56	3·79	8·91	38·77	47·1	1 3 6
18	Locust beans ..	9·0	248·9	1·20	26·88	3·16	11·76	23·72	28·8	0 14 5
19	Malt combs ..	8·0	280·0	3·90	87·36	3·56	4·08	83·80	101·8	2 10 11
20	Fine pollard ..	7·5	298·7	2·45	54·88	3·79	6·91	51·09	62·0	1 11 0
21	Coarse pollard	8·0	280·0	2·50	56·00	3·56	6·35	52·44	63·7	1 11 19
22	Bran	9·0	248·9	2·50	56·00	3·16	5·64	52·84	64·2	1 12 1
23	Clover hay ..	14·0	160·0	2·40	53·76	2·03	3·78	51·73	62·8	1 11 5
24	Meadow hay ..	15·0	149·3	1·50	33·60	1·90	5·65	31·70	38·5	0 19 3
25	Pea straw ..	16·0	140·0	1·00	22·40	1·78	7·95	20·62	25·0	0 12 6
26	Oat straw ..	18·0	124·4	0·50	11·20	1·58	14·11	9·62	11·7	0 5 10
27	Wheat straw ..	21·0	106·7	0·45	10·08	1·36	13·49	8·72	10·6	0 5 4
28	Barley straw ..	23·0	97·4	0·40	8·96	1·24	13·84	7·72	9·4	0 4 8
29	Bean straw ..	22·0	101·8	0·90	20·16	1·29	6·39	18·87	22·9	0 11 6
30	Potatoes	60·0	37·3	0·25	5·60	0·47	8·39	5·13	6·2	0 3 1
31	Carrots	85·7	26·1	0·20	4·48	0·33	7·37	4·15	5·0	0 2 6
32	Parasnis	75·0	29·9	0·22	4·93	0·38	7·71	4·55	5·5	0 2 9
33	Swedish turnips	109·1	20·5	0·25	5·60	0·26	4·64	5·34	6·5	0 3 3
34	Mangel wurzels	96·0	23·3	0·22	4·93	0·30	6·09	4·63	5·6	0 2 10
35	Yellow turnips	193·3	16·8	0·20	4·48	0·21	4·69	4·27	5·2	0 2 7
36	White turnips	150·0	14·9	0·18	4·03	0·19	4·71	3·84	4·7	0 2 4

of the ORIGINAL MANURE-VALUE of CATTLE-FOODS after CONSUMPTION.

PHOSPHORIC ACID.						POTASH.						Total Original Manure- value per Ton of Food Consumed.
In Food.		In Fattening Increase (at 0·86 Per Cent.).		In Manure.		In Food.		In Fattening Increase (at 0·11 Per Cent.).		In Manure.		
Per Cent.	Per Ton.	From 1 Ton of Food.	Per Cent. of Total Consumed.	Total Remain- ing for Manure.	Value at 3d. per lb.	Per Cent.	Per Ton.	From 1 Ton of Food.	Per Cent. of Total Consumed.	Total Remain- ing for Manure.	Value at 24d. per lb.	
per cent.	lbs.	lbs.	per cent.	lbs.	s. d.	per cent.	lbs.	lbs.	per cent.	lbs.	s. d.	s s. d.
1·54	34·50	3·85	11·16	30·65	7 8	1·37	30·69	0·49	1·60	30·20	6 3	2 19 5
2·00	44·80	3·21	7·17	41·59	10 5	1·40	31·36	0·41	1·31	30·95	6 5	3 18 6
3·10	69·44	2·96	4·26	66·48	16 8	2·00	44·80	0·38	0·85	44·42	9 3	5 13 0
1·20	26·88	2·75	10·23	24·13	6 0	0·50	11·20	0·35	3·13	10·85	2 3	1 19 10
2·00	44·80	2·41	5·38	42·39	10 7	2·00	44·80	0·31	0·69	44·49	5 11	3 5 4
1·40	31·36	2·41	7·68	28·95	7 3	2·00	44·80	0·31	0·69	44·49	9 3	3 0 7
2·50	56·00	1·93	3·45	54·07	13 6	1·50	33·60	0·25	0·74	33·35	6 11	4 5 4
0·85	19·04	2·75	14·44	16·29	4 1	0·96	21·50	0·35	1·63	21·15	4 5	2 15 0
1·10	24·64	2·75	11·16	21·89	5 6	1·30	29·12	0·35	1·20	28·77	6 0	3 3 5
0·75	16·80	2·75	16·37	14·05	3 6	0·70	15·68	0·35	2·23	15·33	3 2	3 1 4
0·80	17·92	2·75	15·35	15·17	3 9	0·80	17·92	0·35	1·95	17·57	3 8	3 2 1
0·60	13·44	2·68	19·94	10·76	2 8	0·37	8·29	0·34	4·10	7·95	1 8	1 5 1
0·85	19·04	2·68	14·08	16·36	4 1	0·53	11·87	0·34	2·86	11·53	2 5	1 8 7
0·80	17·92	2·75	15·35	15·17	3 9	0·50	11·20	0·35	3·13	10·85	2 3	1 6 8
0·75	16·80	2·68	15·95	14·12	3 6	0·55	12·32	0·34	2·76	11·98	2 6	1 6 1
0·60	13·44	2·57	19·12	10·87	2 8	0·50	11·20	0·33	2·94	10·87	2 3	1 9 10
(0·60)	(13·44)	2·57	(19·12)	(10·87)	(2 8)	(0·37)	(8·29)	0·33	(4·00)	(7·96)	(1 8)	(1 7 10)
..	..	2·14	..	..	..	..	..	0·27	..	..	..	..
2·00	44·80	2·41	5·38	42·39	10 7	2·00	44·80	0·31	0·69	44·49	9 3	3 10 9
2·90	64·96	2·57	3·96	62·39	15 7	1·46	32·70	0·33	1·01	32·37	6 9	2 13 4
3·50	78·40	2·41	3·07	75·99	19 0	1·50	33·60	0·31	0·92	33·29	6 11	2 17 9
3·60	80·64	2·14	2·65	78·50	19 8	1·45	32·48	0·27	0·83	32·21	6 8	2 18 5
0·57	12·77	1·38	10·81	11·39	2 10	1·50	33·60	0·18	0·54	33·42	7 0	2 1 3
0·40	8·96	1·28	14·28	7·68	1 11	1·60	35·84	0·16	0·45	35·68	7 5	1 8 7
0·35	7·84	1·20	15·31	6·64	1 8	1·00	22·40	0·15	0·67	22·25	4 8	0 18 10
0·24	5·38	1·07	19·89	4·31	1 1	1·00	22·40	0·14	0·63	22·26	4 8	0 11 7
0·24	5·38	0·92	17·10	4·46	1 1	0·80	17·92	0·12	0·67	17·80	3 8	0 10 1
0·18	4·03	0·84	20·84	3·19	0 9	1·00	22·40	0·11	0·49	22·29	4 8	0 10 1
0·30	6·72	0·88	13·10	5·84	1 5	1·00	22·40	0·11	0·49	22·29	4 8	0 17 7
0·15	3·36	0·32	9·52	3·04	0 9	0·55	12·32	0·04	0·32	12·28	2 7	0 6 5
0·09	2·02	0·22	10·89	1·80	0 5	0·28	6·27	0·03	0·48	6·24	1 4	0 4 3
0·19	4·26	0·26	6·10	4·00	1 0	0·36	8·06	0·03	0·37	8·03	1 8	0 5 5
0·06	1·34	0·18	13·43	1·16	0 4	0·22	4·93	0·02	0·41	4·91	1 0	0 4 7
0·07	1·57	0·20	12·74	1·37	0 4	0·40	8·96	0·03	0·34	8·93	1 10	0 5 0
(0·06)	(1·34)	0·14	(10·78)	(1·20)	(0 4)	(0·22)	(4·93)	0·02	(0·34)	(4·91)	(1 0)	(0 3 11)
0·05	1·12	0·13	11·61	0·99	0 3	0·30	6·72	0·02	0·30	6·70	1 5	0 4 0

In a similar manner the productive effects of linseed, linseed-cakes, barley, beans, and swedes, each used in suitable admixture with other foods, have been estimated. Thus, the actual and comparative productive effects of a few characteristic foods have been approximately determined; and from these results the capacity of allied foods has been estimated, taking into consideration the relative amounts of digestible and indigestible constituents, which the foods to be compared on the average contain. It is in this way that the figures in the first and second columns of Table II. have been arrived at. It should be stated, however, that in the case of the straws no direct experimental data were at command, and their productive effects are estimated mainly on their recorded amounts of digestible constituents compared with those in hay, and they are more probably given too high than too low.

It is obvious that such estimates can be only approximately correct; but they are at any rate the best that existing knowledge renders it possible to make. It is pretty certain that the amounts of increase assumed to be produced are higher than those usually obtained. The amount estimated to be yielded by linseed-cake, for example, is certainly higher than would be obtained, when, as is sometimes the case, it is given in such excessive amount that much is voided by the animals undigested. On the other hand, the amounts of the different foods estimated to be required to give 1 part of increase are doubtless higher than would be so required, if as large a proportion of the constituents were digested and utilised as have been shown to be digestible in the German experiments on that subject. In those experiments the animals were for the most part kept on mere sustenance food, so that they would digest the maximum proportion of the constituents they received. In the case of fattening, however, especially with early maturity, the conditions are very different. The animal receives a greater or less excess of food, and not only voids proportionally more undigested, but may transform more than is fully utilised. It is, nevertheless, economy to give an excess within certain limits. The apparent waste is, in fact, more than counterbalanced. Thus, in the first place the manure-value of the not utilised food still remains intact; but the real source of the economy is in the shortening of the time of feeding, and so, at the cost of some excess of food, saving the amount that would be expended in the mere sustenance of the animal for a longer period.

Trusting that, with these explanations, the figures will not be misunderstood, we may proceed to the consideration of the rest of the Table, only further remarking in regard to the estimates in

question, that the amount of the manure-constituents of the food carried off by fattening increase is under all circumstances so small that, for the purposes of our calculations of manure-value, even a considerable variation from the average amounts assumed to be taken up by the animal would affect the final result but little.

The next division of the Table (II., pp. 600-1), comprising seven columns, relates to the amount, and to the distribution, of the nitrogen of the foods. There are given—the amounts of it per cent., and per ton, as in Table I.; the actual amount estimated to be contained in the increase in live-weight of the animal consuming the food, and the percentage of the total nitrogen consumed which is so retained in the increase; the amount of the nitrogen of the food remaining for manure, the amount of ammonia to which it corresponds, and its money-value reckoned at 6*d.* per lb. of ammonia.

Throughout the calculations, we have assumed only fattening increase to be produced, and that this will contain 8 per cent. of nitrogenous substance, corresponding to 1.27 per cent. of nitrogen in the increase. It will be seen that, according to the figures, the only food in the list of which a ton is estimated to contribute more than 5 lbs. of nitrogen to the fattening increase is linseed, and that in the case of none of the cakes, or of the leguminous seeds, will 1 ton contribute 5 lbs. of nitrogen to the increase; whilst the amount is in several cases under 4 lbs. A ton of the cereal grains, or of their products (and locust beans), generally contributes under 4 lbs.; a ton of hay or straw less than half as much; and a ton of roots very much less still.

To put it in another way: of the total nitrogen consumed in the foods rich in that substance, such as the cakes and the leguminous seeds, there is generally less than 5 per cent. retained in the fattening increase in live-weight. The cereal grains, on the other hand, which are much less rich in nitrogen, contribute a much larger proportion of their total amount to the increase; indeed, generally about 10 per cent. of it. The gramineous straws contribute a higher proportion still; whilst the roots lose by feeding on an average only about 5 or 6 per cent.

It is thus seen that, when fattening increase only is produced, the proportion of the nitrogen of the food which is retained by the animal, and so lost to the manure, is very small in the case of the richer foods, but more in that of the poorer ones; but even with them it seldom exceeds 10 per cent., excepting with the straws. It may be assumed, however, that when the foods are consumed by store animals, about twice as much of the nitrogen of the food is retained by the animal, and so lost to the manure. And when, as is more and more the case with early

maturity, the increase comprises a larger proportion of growth than in mere fattening, the amount of the nitrogen of the food which will be lost to the manure will be between that given in the Table and twice as much.

The third division of the Table relates to the phosphoric acid, and there are given for each food, as in the case of the nitrogen, the amounts of it per cent. and per ton, of the foods; the amount estimated to be retained in the increase; the amount remaining for manure, and the money-value of this at 3*d.* per lb.

It will be seen that there is only about two-thirds as much phosphoric acid as of nitrogen retained in a given weight of fattening increase; but owing to the very generally less, and sometimes much less, amount of it in the foods, a greater proportion of that consumed is retained in the animal, and a less proportion remains for manure. It should be added that, in the case of store and still growing animals, the amount of phosphoric acid retained in a given weight of increase will be very much greater than in mere fattening; indeed in mere store increase it may, as in the case of the nitrogen, be nearly twice as great as in mere fattening.

Of potash, the Table shows that a given weight of fattening increase retains only about one-eighth as much as it does of phosphoric acid; and the percentage of the whole in the food which is lost to the manure is generally very small. In its case, as in that of the nitrogen and phosphoric acid, the amount retained in mere store increase will be nearly twice as much as in mere fattening increase, but the total quantity retained is still very small. The potash remaining for manure is valued at 2½*d.* per lb.

The last column of Table II. shows the total manure-value of a ton of each of the foods after consumption, reckoning the nitrogen, the phosphoric acid, and the potash, at the prices above named, which are those at which they can, at the present time, be purchased in artificial manures. In our formerly-published estimates we valued the nitrogen and phosphoric acid at the prices at which they could then be purchased in Peruvian guano. In those estimates ammonia was taken at 8*d.* per lb., but now it is reckoned at only 6*d.*; phosphoric acid was taken at about 2¼*d.*, but now at 3*d.* per lb. (as in "precipitated phosphate"); and potash was then valued at 2*d.* per lb., but now at 2½*d.*

Notwithstanding the somewhat higher value now given to phosphoric acid and potash, and the less amount of the nitrogen of the food now reckoned to be lost by the feeding, the reduction in the price of ammonia by one-fourth, brings all the estimates of total manure-value lower now than formerly. Thus, the

manure-value of a ton of linseed-cake consumed, which was previously reckoned at 4*l.* 12*s.* 6*d.*, is now taken at 3*l.* 18*s.* 6*d.*; that of a ton of maize is reduced from 1*l.* 11*s.* to 1*l.* 5*s.* 1*d.*; and that of other foods in varying proportions, depending partly on the alteration (if any) in the adopted average composition of the foods, but mainly on the reduction in the money-value assigned to ammonia.

III. UNEXHAUSTED MANURE-VALUE OF CATTLE FOODS.

So much for the method, and the results, of the estimation of the *total* or *original manure-value* of the different foods, deducting merely the nitrogen, the phosphoric acid, and the potash, estimated to be retained by the animal consuming them. We have now to attempt the still more complicated and difficult task of endeavouring to estimate the *unexhausted manure-value* of the different foods, or what may be called their *compensation-value*, after they have been used for a series of years by the outgoing tenant, and he has realised a certain portion of the manure-value in his increased crops.

As already said, we have in the case of a number of the foods endeavoured to estimate the probable amounts of increase that the tenant would obtain in his barley and wheat crops, supposing that the food were used at the rate of one ton per acre in eight years, or one ton over 8 acres each year; and then, after making allowance for loss, we have estimated the value of the unexhausted residue at a declining rate from the last to the eighth year. These results gave a basis for consideration, and, having studied them, and settled what seemed to be a suitable allowance, we have fixed upon a scale of reduction, starting from the *original manure-value* as estimated in Table II.

The rule so determined upon is to deduct one-half of the original manure-value of the food used the last year, and one-third from year to year each year to the eighth, in the case of all the more concentrated foods, and the roots, in fact of all the foods in the list excepting the hays and the straws; and for these, which contain larger amounts of indigestible matter, and the constituents of which will be more slowly available to crops, two-thirds of the original manure-value is deducted for the last year, and only one-fifth from year to year to the eighth year.

The results of the estimates of *compensation-value* so made are given in Table III. (p. 606). The first column shows the *total* or *original manure-value* of each food. The second column shows the allowance for the last year, and the succeeding seven columns that for each succeeding year to the eighth. The last

TABLE III.—PLAN and RESULTS of ESTIMATIONS of the COMPENSATION-VALUE of UNEXHAUSTED MANURE, starting from the ORIGINAL MANURE-VALUE, that is the VALUE deducing the constituents of increase in FATTENING LIVE-WEIGHT only.

Foods.	Original Manure- value, deducting Increase in Live-weight only.	Compensation-value of Unexhausted Manure.									
		Last Year.	Second Year.	Third Year.	Fourth Year.	Fifth Year.	Sixth Year.	Seventh Year.	Eighth Year.	Total.	
DEDUCT $\frac{1}{2}$ of ORIGINAL MANURE-VALUE the LAST YEAR, and $\frac{1}{3}$ from YEAR to YEAR.											
One Ton.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1. Linseed	2 19 5	1 9 9	0 19 10	0 13 2	8 10	5 10	3 11	2 7	1 9	4 5	5 13
2. Linseed-cake ..	3 18 6	1 19 3	1 6 2	0 17 6	11 8	7 9	5 2	3 5	2 4	5 13	5 13
3. Decorticated cotton-cake ..	5 13 0	2 16 6	1 17 8	1 5 1	16 9	11 2	7 5	4 11	3 4	8 2	8 2
4. Palm-nut cake ..	1 19 10	0 19 11	0 13 3	0 8 10	5 11	3 11	2 8	1 9	1 2	2 17	2 17
5. Undecorticated cotton-cake ..	3 5 4	1 12 8	1 1 10	0 14 6	9 8	6 6	4 4	2 10	1 11	4 14	4 14
6. Cocoa-nut cake ..	3 0 7	1 10 3	1 0 2	0 13 5	9 0	6 0	4 0	2 8	1 9	4 7	4 7
7. Rape-cake ..	4 5 4	2 2 8	1 8 6	0 19 0	12 8	8 5	5 7	3 9	2 6	6 3	6 3
8. Peas	2 15 0	1 7 6	0 18 4	0 12 3	8 2	5 5	3 7	2 5	1 7	3 19	3 19
9. Beans	3 3 5	1 11 9	1 1 2	0 14 1	9 5	6 3	4 2	2 9	1 10	4 11	4 11
10. Lentils	3 1 4	1 10 8	1 0 5	0 13 8	9 1	6 1	4 1	2 8	1 9	4 8	4 8
11. Tares (seed) ..	3 2 1	1 11 1	1 0 8	0 13 9	9 2	6 1	4 1	2 9	1 10	4 9	4 9
12. Indian corn ..	1 5 1	0 12 6	0 8 4	0 5 7	3 8	2 6	1 8	1 1	0 9	1 16	1 16
13. Wheat	1 8 7	0 14 3	0 9 6	0 6 4	4 3	2 10	1 11	1 3	0 10	2 11	2 11
14. Malt	1 6 8	0 13 4	0 8 11	0 5 11	4 0	2 8	1 9	1 2	0 9	1 18	1 18
15. Barley	1 6 1	0 13 1	0 8 8	0 5 9	3 10	2 7	1 9	1 2	0 9	1 17	1 17
16. Oats	1 9 10	0 14 11	0 9 11	0 6 8	4 5	2 11	2 0	1 4	0 11	2 3	2 3
17. Rice meal ..	(1 7 10)	(0 13 11)	(0 9 3)	(0 6 2)	(4 1)	(2 9)	(1 10)	(1 3)	(0 11)	(2 0)	(2 0)
18. Locust beans ..	..	..	..	..	..	..	..	..	..	..	..
19. Malt coombs ..	3 10 9	1 15 4	1 3 7	0 15 9	10 6	7 0	4 8	3 1	2 1	5 2	5 2
20. Fine pollard ..	2 13 4	1 6 8	0 17 10	0 11 10	7 11	5 3	3 6	2 4	1 7	3 11	3 11
21. Coarse pollard ..	2 17 9	1 8 10	0 19 3	0 12 10	8 7	5 8	3 10	2 7	1 8	4 3	4 3
22. Bran	2 18 5	1 9 2	0 19 6	0 13 0	8 8	5 9	3 10	2 7	1 8	4 4	4 4
DEDUCT $\frac{2}{3}$ of ORIGINAL MANURE-VALUE the LAST YEAR, and $\frac{1}{3}$ from YEAR to YEAR.											
One Ton.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
23. Clover hay ..	2 1 3	0 13 9	0 11 0	0 8 9	7 0	5 7	4 6	3 7	2 11	2 17	2 17
24. Meadow hay ..	1 8 7	0 9 6	0 7 7	0 6 1	4 11	3 11	3 2	2 6	2 0	1 19	1 19
25. Pea straw ..	0 18 10	0 6 3	0 5 0	0 4 0	3 3	2 7	2 1	1 8	1 4	1 6	1 6
26. Oat straw ..	0 11 7	0 3 10	0 3 1	0 2 6	2 0	1 7	1 3	1 0	0 10	0 11	0 11
27. Wheat straw ..	0 10 1	0 3 4	0 2 8	0 2 2	1 9	1 5	1 1	0 11	0 8	0 11	0 11
28. Barley straw ..	0 10 1	0 3 4	0 2 8	0 2 2	1 9	1 5	1 1	0 11	0 8	0 11	0 11
29. Bean straw ..	0 17 7	0 5 10	0 4 8	0 3 9	3 0	2 5	1 11	1 6	1 3	1 4	1 4
DEDUCT $\frac{1}{2}$ of ORIGINAL MANURE-VALUE the LAST YEAR, and $\frac{1}{3}$ from YEAR to YEAR.											
Ten Tons.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
30. Potatoes ..	3 4 2	1 12 1	1 1 5	0 14 3	9 6	6 4	4 3	2 10	1 11	4 11	4 11
31. Carrots ..	2 2 6	1 1 3	0 14 2	0 9 5	6 4	4 2	2 10	1 10	1 3	3 11	3 11
32. Parsnips ..	2 14 2	1 7 1	0 18 1	0 12 1	8 0	5 4	3 7	2 4	1 7	3 11	3 11
33. Swedish turnips ..	2 5 10	1 2 11	0 15 3	0 10 2	6 10	4 6	3 0	2 0	1 4	3 11	3 11
34. Mangel wurzels ..	2 10 0	1 5 0	0 16 8	0 11 1	7 5	4 11	3 4	2 2	1 6	3 11	3 11
35. Yellow turnips ..	(1 19 2)	(0 19 7)	(0 13 1)	(0 8 9)	(5 10)	(3 11)	(2 7)	(1 9)	(1 2)	(2 0)	(2 0)
36. White turnips ..	2 0 0	1 0 0	0 13 4	0 8 11	5 11	3 11	2 8	1 9	1 2	2 0	2 0

column gives the *total compensation-value* for the eight years' consumption.

It may seem at first sight that a deduction of 50 per cent. from the original manure-value of the food used in the last year is large; but we have not only to make allowance for all losses to which the manure may be subject, which may be considerable, especially if much of the food is consumed in the yards; but it is also to be borne in mind that the money paid for compensation will not yield its full return for a long time. Only half the original manure-value would therefore be allowed if the food were only used one year; and all scales of allowance arranged by Farmers' Clubs assume the consumption for more than one year. If, however, the food is used for eight years, or more, it will be seen that the total allowance considerably exceeds the original manure-value of one year's consumption; the allowance made for the accumulation bringing it up to from one-and-a-third to one-and-a-half as much as the original manure-value.

In order to test the applicability of the scale of compensation proposed, let us take a very simple and ordinary case, and see what would be the allowance allotted to the outgoing tenant according to the estimate given in the Table. Let us suppose the case of a Norfolk or Lincolnshire farm under the ordinary four-course rotation, with meat and grain only sold, the roots fed partly on the land and partly in the yards. Assume, further, that the land is thoroughly clean, and that the farm is in every respect in good order when given up. It is pretty certain, indeed, that every claim for compensation will have to be settled on its own merits; that the character of the soil, the cropping, the state of the land as to cleanliness, and many other points, will be taken into consideration, both for and against any claim.

As already intimated, the essential basis of the system of estimate and valuation of the unexhausted residue adopted, is the assumption of gradual accumulation within the soil, and of slow recovery from it. Suppose then that linseed-cake had been used annually for eight years, at the average rate of one ton per acre in eight years, or of one ton over eight acres each year. Each acre would thus, on the average receive, either in farm-yard-manure, or directly by the feeding with roots or clover on the land, the manure from the consumption of one ton of linseed-cake in eight years, or at the average rate of one-eighth of a ton, or $2\frac{1}{2}$ cwt., per acre, per annum.

The first column of Table III. shows that the *original manure-value* of one ton of linseed-cake consumed, that is, the value deducting only the constituents stored up in the animal, is estimated to be 3*l.* 18*s.* 6*d.*; and the subsequent columns show

the estimated *compensation-value* of the *unexhausted residue* (that is, after the tenant has realised the benefit of the increase of his crops), to be, if used each year for eight years, as given in the first column of the following Table; the second column showing the amount per acre per annum:—

	Compensation Allowance for One Ton of Linseed-cake consumed.	
	Per Annum, Eight Years.	Per Acre, in Eight Years.
	£ s. d.	£ s. d.
Last year	1 19 3	0 4 11
2nd "	1 6 2	0 3 3
3rd "	0 17 6	0 2 2
4th "	0 11 8	0 1 6
5th "	0 7 9	0 1 0
6th "	0 5 2	0 0 8
7th "	0 3 5	0 0 5
8th "	0 2 4	0 0 3
Total	5 13 3	0 14 2

Thus, according to the Table, the value of the *unexhausted manure-residue* from the consumption of one ton of linseed-cake annually for eight years would be 5*l.* 13*s.* 3*d.*, or nearly 45 per cent. more than the original manure-value of one year's consumption; or, as the second column shows, the allowance would be at the rate of 14*s.* 2*d.* per acre over the whole farm.

Whether such an allowance would be too much or too little under the circumstances supposed, is a question for consideration. The conditions supposed are—a light-land farm, upon which the manure from purchased food is an essential element of profitable cultivation; that meat and grain alone are sold; and that the farm is given up in a satisfactory state in every respect. Also that each acre received, on the average, during the last eight years, the manure derived from the consumption of one ton of linseed-cake. The question between the two parties concerned is, whether the outgoing tenant would receive sufficient remuneration for his *unexhausted manure*? and, on the other hand, whether the landowner, or the incoming tenant, would pay more than will be recovered in increase of crops? An allowance of 14*s.* 2*d.* per acre on a farm of 400 acres, would amount to 283*l.* 6*s.* 8*d.*, which is a large sum to pay; and it is certain that the recovery of the amount will only be gradual. It is well known that both time and money are required to get land into condition, and here is land already in condition.

Let us consider the effect of such a valuation of *unexhausted*

manure from two opposite points of view. The outgoing tenant may consider that he is entitled to a larger sum, and he prefers to claim compensation under the Act. The outgoing tenant of the future will, however, have another alternative. He can reduce the stock of fertility by the consumption of foods which have high feeding- but low manure-value, and which are lower in price than the foods which possess both high feeding- and high manure-value. The incoming tenant knows what he has to pay for, and has only himself to blame if he pays too much. But behind the incoming tenant is the landowner, who must himself pay the claim of the outgoing tenant if he can find no one else to do so. It is, therefore, a matter of importance to the landlord that the compensation should be fixed on a basis sufficiently reasonable to render it not worth his while to carry the case to arbitration, or into a court of law.

In 1876, Mr. Thomas Huskinson, who was at that time President of the Institute of Surveyors, gave evidence before the Chemical Committee of the Royal Agricultural Society in reference to the Lincolnshire custom. He said that compensation was the universal custom so far as cakes were concerned, but not in the case of any other foods. For cakes, one-half the cost of the last year's consumption was allowed; but this was not to be more than the average of the two preceding years. At that date the price of linseed-cake was higher than at present, and very much higher than was that of decorticated cotton-cake, which was only used in comparatively small quantities, nor was its higher manure-value generally recognised. It may be observed that the above allowance of 5*l.* 13*s.* 3*d.*, founded, not on cost, but on original and unexhausted manure-value, would considerably exceed half the cost of one year's consumption at the present price of linseed-cake.

It must be evident that the custom of giving compensation upon cakes alone, as in Lincolnshire and some other counties, has acted as a bounty in favour of such foods, and has so artificially enhanced their relative price. The Act of 1883, however, gives compensation for unexhausted manure-value, whenever it can be proved to exist, by the use of whatever food, or manure, it may have been accumulated in the soil. It is very desirable, therefore, to endeavour to make, and to publish, for the information and the consideration of those whose business it is to settle claims for compensation, the best estimates which the knowledge of the time permits—of the average composition, not only of cakes, but of all other foods likely to be used, of their total manure-value after consumption, and of their unexhausted manure-value after they have yielded increase of the crops grown.

It will be obvious that, if it is once admitted that the manure-value of foods depends on their composition, and on the date of their consumption, it is very important that farmers should be at liberty to use those foods which are at the time the cheapest, or otherwise the most advantageous. It is true that, hitherto, he could do so, but not without running the risk of losing his claim for compensation for unexhausted fertility; or, at any rate, he would not benefit from those arrangements for compensation which have been made between owners and occupiers of land to avoid litigation. Such arrangements are most laudable; but they have been confined in their application to a few favourite articles, which have thereby been enhanced in price beyond their natural commercial value. It is in the hope that the extension of such arrangements to foods generally will be facilitated, that we have been encouraged to draw up and to publish the Table of allowances now under consideration.

As before referred to, we have, in the construction of the Table (III.), in all cases adopted one uniform rate of deduction from year to year, excepting in those of the hays and the straws, as already explained, and as shown in the Table. We do not, however, at all assume that there is no difference in the activity of the manure from the different foods thus classed together, or that their unexhausted residue will be available at exactly the same rate. Then, again, it is obvious that to assume the consumption, and the manure-value, to be the same on each acre, and in each year, is not strictly in accordance with the facts, as one year the food will produce animal increase, and another year increase in crops, and so on. But to have attempted to fix a different scale for each food, and for each year, according to such circumstances, would have been to assume a knowledge which we do not possess. We have thought it better, therefore, to submit the Table for the consideration of those interested, as the best approximation to the truth that we are at present able to provide.

Although it is to be borne in mind that the whole of the estimates are founded on the assumption that fattening increase only is produced, yet we have indicated the direction, and indeed to a considerable extent the degree, in which the figures should be modified when store animals are reared or fed. It should be added that, in the case of the foods being used for the production of milk, an entirely different scale of original and unexhausted manure-value would have to be arranged, as milk removes so very much more of the manure-constituents of the food than increase in live-weight of any kind.

In conclusion, although we were only requested to revise the Table of total, or original manure-values of food-stuffs, chiefly

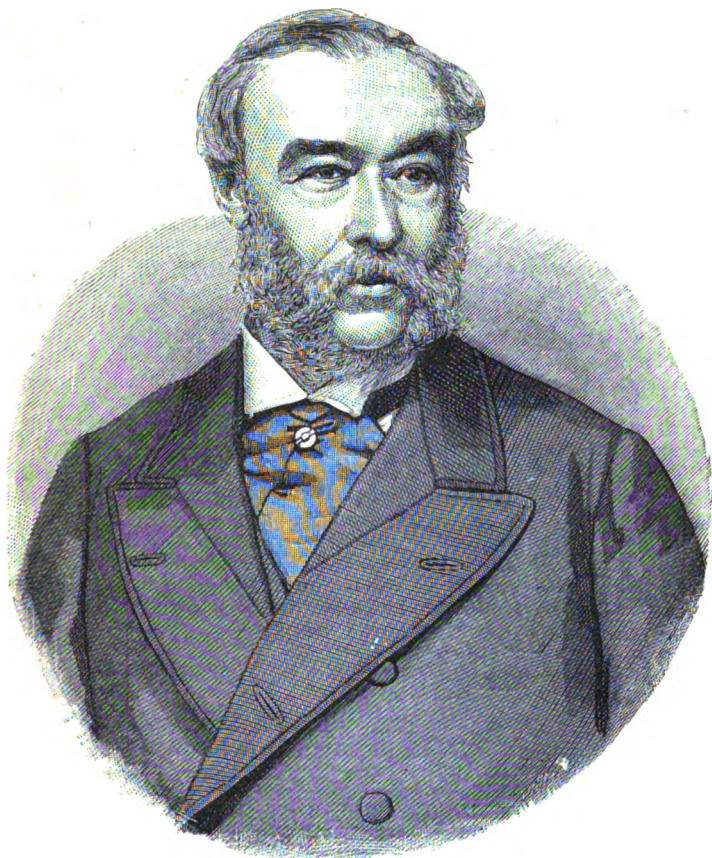
as affected by the change in the price of ammonia, we have thought it desirable to carry the subject further, and to endeavour to put forward a scheme for the valuation of *unexhausted manures* also. The results will doubtless require revision from time to time, as the value of manure-constituents in the market changes, and perhaps also in other ways, as knowledge advances, and experience is gained. But the passing of the Act of 1883, and the problems and the discussions to which it must necessarily give rise, seemed to render such an attempt very opportune at the present time. It is to be understood, however, that in the use of the Table, the special circumstances of each case must be taken into account, and the actual figures adopted, or modification made, accordingly. Independently of such direct application of the results, it will be a point of importance gained, if valuations come to be made on the basis of manure-value, and not of cost; and perhaps one of still greater importance, if the scale we have submitted should lead to the general recognition of the fact that *unexhausted manure-value* should be subject to compensation, from whatever food it may have been derived; thus enabling the farmer to use any food that may be the most advantageous at the time, without fear of losing his claim to compensation under amicable arrangements. At any rate, as we have given the data on which our estimates are founded, and explained the method by which they have been obtained, those interested in this most difficult subject have the means of forming their own conclusions on the results arrived at.

XXV.—*The late Sir B. T. Brandreth Gibbs.* By J. CHALMERS MORTON, Editor of the 'Agricultural Gazette.'

THE readers of this volume of our 'Journal' will expect some reference in its pages to the very great loss which they have sustained by the recent death of one of the oldest members of the Society, who was also unquestionably one of its oldest and most devoted servants. Than the late Sir Brandreth Gibbs, I do not suppose any one can be named whose whole life has been more actively devoted, especially through the influence and agency of the Royal Agricultural Society of England, to the promotion of the interests of English Agriculturists. An original member of the Society—on its formation, at the instance of Lord Spencer, Mr. Philip Pusey, the Duke of Richmond, Mr. Henry Handley, and Mr. William Shaw, all now passed away—he had trodden every step in the ranks of the great

organisation which he served, from simple membership upwards. He was elected to membership of the Council in 1848. He was appointed Organiser of its Annual Exhibitions in 1843. He subsequently occupied for a time also the office of Secretary. He became one of the Vice-Presidents of the Society in 1871; and he was called to the Presidential Chair during the year before his death. He requires a biographer—himself an original member, and an active spectator and historian of the great work which the Society has witnessed and promoted—who might thus have watched with interest his whole career, throughout its more than forty years; and I ought to be better able than I am to undertake the task which has been allotted to me. Although, however, present at the first Meeting of the Society at Oxford, and already one of its members—present also, except in 1840, 1842, 1848, and 1854, in every one of the Showyards in which the Society has since made its annual display, and actively engaged at all of them since 1843 as a Reporter of everything in which the agricultural reader might be expected to take an interest—it was not till some years after the commencement of Mr. Brandreth Gibbs's connection with the Society that I came to know him personally. I remember the faces and the voices of many of our great leaders present at the Oxford Show—the homely, kindly presence of the late Earl Spencer, our first President; the sonorous voice of the late Duke of Richmond, who succeeded him; Mr. Pusey's pale and anxious, somewhat absent-looking face; Mr. Handley's hearty jollity; Baron Bunsen's staid and placid countenance; the voice, good-nature, and the humour, of the Rev. Dr. Buckland—a distinguished row, seated, as they were, with others at the dais, on the occasion of the Banquet given to the Council at that Meeting: Daniel Webster also, evidently a great power both bodily and intellectually; Sir Thomas Acland, bright-eyed, eager-looking; and Sir James Graham—all of them speakers at the Banquet on the following day in one of the College Quadrangles. These were men and faces likely to impress themselves on the memory; and perhaps it is not surprising that, in comparison with them, I do not remember the young man then already busily engaged in the Showyard, whose serviceableness and activity had attracted the attention of the President; engaged as he was in assisting his elder brother, Mr. Humphrey Gibbs, to whom the Stewardship of the Yard had been committed. Mr. Brandreth Gibbs, entering thus, *con amore*, on the multifarious duties which belonged to the office which he ultimately held, as Honorary Director of the Annual Shows, served a capital apprenticeship during his first few years under the direction of his very able brother; and thus, no doubt, he early acquired both the *bonhomie* which enabled

him to deal patiently and successfully with the multitude of interests involved in a great Show of live-stock and of implements—contributed to, as it has always been, by a multitude of exhibitors—and the punctuality, precision, and regularity of a perfect routine, by whose orderliness and exactness the work of that office was both better done and made much easier to do.



THE LATE SIR B. T. BRANDRETH GIBBS.

On the occasion of the late Liverpool Show in 1877, Mr. Gibbs was good enough to send me his *Recollections of the Liverpool Show in 1842*, when for the third time he was thus helping his brother in the Stewardship of the Yard. The following extracts from his letter on that occasion are interesting, not only for the points of historical interest which it records, but for the

references which it makes to the changes which he himself had witnessed in the Society's proceedings.

"It was the Society's third Show, the two preceding having been held at Oxford and at Cambridge. These, however, had paved the way for the marked improvement which Liverpool showed over its predecessors; and this in a great degree was in the Implement Department, which hitherto had been inconsiderable—so much so, that implements had not even had any special shedding. In 1841, however, this was accorded them, and two rows of sheds were filled,—a large show for that period,—and the Judges spoke of the improvement in their quality and construction as 'a vast stride in the mechanics of agriculture,' which resulted 'from the encouragement given by the Society to these objects.'

". . . The names of many who still do credit to our Showyard already figured in the prize-lists of that period. It is true we no longer have the Earl of Ducie, who then had a factory, and was a considerable exhibitor and prize-taker; but still, as then already conspicuous, we have the Ransomes, Hornsby, Howards, Garretts, Crosskills, Cooch, and others, who competed successfully in 1842.

"The great 'novelty' of that Meeting the Judges reported to be a 'portable steam-engine.' It was a patent disc engine, invented by Mr. Davis, of Birmingham, but exhibited by Messrs. Ransome, who must therefore be credited with the honour of having exhibited the first portable steam-engine at our Shows.

"Among the prize-takers, Hornsby and Garrett were then conspicuous with their drills; Garrett, Huckvale, and Lord Ducie with their horse-hoes; Cooch with dressing-machines; Wedlake with hay-rakes; and Smith, of Deanston, with chain harrows.

"The general arrangement of the Liverpool Show differed from its predecessors. Hitherto the live-stock had been placed under shedding round the outer fencing; whereas, on this occasion, the plan of parallel sheds was adopted, and has been found so advantageous that it has been followed ever since when the nature of the site permitted. . . . Of the extent of the Showyard in 1842 I cannot speak with certainty; but I well recollect that it was but a very few acres, much less than at the Southampton Meeting three years later, when it was thought the Society had enclosed an enormous Showyard, including a trial-yard, the total being 14 acres.

"Now in 1877 we again visit Liverpool, and occupy something like 80 acres.

"There are a few points connected with this period of the Society's history which perhaps may be interesting to those whose experience only goes back to some of the recent Shows. Such, for instance, as that there was no arranged catalogue of implements, with reference numbers, &c. Those entered for competition did not stand as a part of the general collection of the firm to which they belonged, but were placed by themselves. Thus all the drills were together, and so on; no doubt very convenient for comparison by visitors, but a system that had to be abandoned, as it entailed on the exhibitors a number of attendants, and would be quite impracticable with such extensive collections as are now sent by the leading firms.

"In the live-stock department matters were quite as different. Public judging was not contemplated, and so great was the desire for secrecy, that the animals arrived under a fictitious number, which was changed for a permanent number early in the morning of the judging day; this being intended to frustrate any knowledge on the part of the Judges as to the ownership of the animals. Such a precaution now seems strange indeed, because the number of Shows at which animals compete, and their coming year after

year, from calves up to full maturity, makes all the notable stock so well known, that the best precaution is to have Judges in whose honour and integrity perfect confidence may be placed.

"The award also was, as far as possible, kept secret until it was publicly announced at the Council dinner, which took place on the judging day.

"The Show was held on a small plot of land called Falkner's Fields (if I recollect rightly). It is now, I believe, covered with streets and houses, as, on visiting the locality, I failed to discover the site once so familiar to me.

"There may be other matters which I have forgotten, so many subsequent Shows having intervened; but there are two firmly impressed on my mind, viz. that I was wet through nearly all day in the Yard receiving the cattle, &c.; and that I had to remain at work during the entire night, preparing for the numbering, &c., of the stock for the Judges next morning. All this, however, soon got changed; and by systematic arrangement the larger Shows can now be conducted with an ease and regularity unknown at this early period of the Society's history."

The Liverpool Meeting soon grew into annual gatherings of its manifold limits; but the labour and discomfort of superintendence and direction which are here referred to did not grow in similar proportion. Mr. Brandreth Gibbs received the formal appointment of Honorary Director of the Showyards of the Society in 1843, and soon brought his powers of organization and administration to bear upon the difficulties of his office. Regularity, promptitude, and punctuality, with rigid adherence to well-considered rules, soon made everything go easy. Nor must we imagine that here was a martinet who made everything "go" as he desired by sheer force of will. A certain elasticity, and even an uncertain vagueness, were by no means wanting in the rules and provisions which he arranged—a vagueness, however, it must be confessed, which seemed contrived rather to increase the power of the Director than to facilitate encroachments on it. There was formerly (and it still to some extent survives) an "&c." at the end of many of the regulations under which exhibitors are made welcome; and its value was early recognized. The story goes that a clever exhibitor had obtained entrance for his contrivance in the implement department "as an invention for the acceleration of the speed of the periphery of a fly-wheel." When the Yard was crowded with spectators on the third and following days of the Meeting, he produced his "fly-wheel" in the form of an attractive spinning-top of unusual size and shape; and a rapid sale of toys was thus soon going on, and a harvest of a decidedly non-agricultural kind was being reaped, greatly to the scandal of the authorities. There was some difficulty in bringing the rules of the Yard to bear upon the offender and his playthings; but, as our informant says, the fortunate "&c." at the end of one of the provisions enabled Mr. Gibbs "to bag the lot." No one, we are sure, will imagine from this short reference to the precision,

punctuality, and regularity, with which the multifarious details and interests involved in the annual Shows of the Society were regulated and administered by the Honorary Director, that he was ever wanting in courtesy to all, or in kindness to any in difficulty or perplexity. Both exhibitors and spectators for more than a quarter of a century would readily bear testimony to the contrary of that, as well as to the very severe trials of patience and of temper, out of which the Honorary Director always came victoriously. The arrangements with the local authorities, the difficulties connected with the Showyard itself, the superintendence of the contract for the works, the separate interests of many hundreds of exhibitors in the two divisions of the Exhibition, the crowd of claimants on the attention at the commencement and the close of each Meeting—all together made the office, which was held by Mr. Brandreth Gibbs during the thirty years between the Liverpool and the Taunton Meetings, one of great difficulty and anxiety. Mr. Gibbs retired from it after the Bedford Meeting in 1874, receiving, as he well deserved, the formal and hearty thanks of the Society for his long and most efficient services. He had previously received the large Gold Medal and thanks of the Society for undertaking with characteristic public spirit the Secretaryship during a temporary vacancy. His election to the Vice-Presidency followed.

During the year 1843, which witnessed his appointment to the Honorary Directorship of the Showyard of the Royal Agricultural Society, Mr. Gibbs also became Honorary Secretary to the Smithfield Club, which up till 1839 had stood alone in England as a national Society for the promotion and improvement of the live-stock of the farm. Arthur Young had been the first Honorary Secretary of the Club, and between 1806 and 1836 a paid Secretaryship was held by the late Mr. John Farey and his son. During the seven following years the Honorary Secretaryship was held by Mr. Humphrey Gibbs (who afterwards took the maternal name of Brandreth), and for forty years afterwards the Honorary Secretaryship devolved upon his brother, the subject of this Memoir. These particulars are taken from a History of the Club, written by Sir Brandreth in 1857, and afterwards revised by him up to 1880. A most interesting record it is of long-continued public-spirited effort directed to most useful ends. His duties in this office have been latterly undertaken by Mr. Henry Hine, the present Secretary of the Club; but he was always ready with cordial and efficient help on any emergency; and he expressed to me the pleasure with which a few years ago, on Mr. Hine's temporary illness at the time of the Annual Show, he had resumed once more the

superintendence of all the details of his former office. In 1853, at the hands of the Duke of Richmond, and again in 1878, at the hands of the then President, H.R.H. the Prince of Wales, Mr. Gibbs received the thanks of the Club for the long-continued services which he had rendered.

Sir Brandreth Gibbs's services to Agriculture include much that lay outside the two great Societies with which he was more immediately connected. He took an active part in the organization of the two Great Exhibitions of 1851 and 1862, being superintendent on both occasions of the very important Agricultural Department of each. In 1855 he was in charge of the English Agricultural Section of the Great Exhibition in Paris; and he received from the Imperial Government of France a gold medal for the assistance rendered by him as a member of the Committee of Advice for the International Live Stock Show at Passy on that occasion. In 1867 he acted as Special Commissioner for the Agricultural Department of the second Great French Exhibition. And at the Universal Exhibition in Paris, during 1878, he was again General Superintendent of the British Agricultural Section; and forty pages of the Catalogue of that section of the Exhibition are filled with his 'Notes on British Agricultural Machinery, and on the Principal Breeds of British Live Stock.' For his services at that time Mr. Gibbs received from the President of the French Republic the decoration of Officer of the Legion of Honour. He had previously been engaged in 1873 as member of the Committee of Advice for the agricultural portion of the Exhibition at Vienna, receiving the Austrian Order of Francis Joseph from the Emperor for his services; and he was Superintendent of Agricultural Machinery and Live-stock at the Show at Philadelphia in 1876.

In the year 1878 Mr. Brandreth Gibbs received the honour of Knighthood at the hands of Her Majesty the Queen—certainly a well-deserved distinction after his life-long services. Nor had his labours been those merely of an organizer or director. In the midst of his many engagements, to all of which he was ever loyal, and in all of which he was laborious, he never lost an opportunity of enlisting and stimulating others. He was an active member of the Food Committee of the Society of Arts, and I remember meeting him some years ago near Charing Cross on his way to one of its meetings—for, though also a member, I was walking the other way—and his remonstrance, not soon to be forgotten, may be mentioned here as characteristic of the man.

Sir Brandreth Gibbs had been elected Director and Secretary of the Grand International Fisheries Exhibition of 1883, but

had to resign his office in consequence of illness. Examining the long list of public engagements—all of them unpaid offices, of which Sir Brandreth Gibbs's whole life was full—engagements occupying at least a month at a time twice in every year for thirty and forty years, besides occasional Commissions, also exhaustive of much time and labour, undertaken for our own and other Governments, I am very deeply impressed—as I am sure the reader is, with a sense of the great public value, especially to English Agriculture, of the career—always as modest and unpretending as it has been useful—which has just closed. Surely there has hardly ever been a life more completely full of fruitful honorary services—life-long unpaid labour of the highest value, not only for its direct results, but for its great example of unselfish public spirit, “faithful” always to the “talent” entrusted to its keeping.

Nor must we forget the services rendered to English agriculture for several generations by the seed firm now more than a century old, of which for many years Sir Brandreth Gibbs was the sole representative. The business of this seed firm had till he joined it been carried on by the late Mr. Thomas Gibbs, who ultimately took Ben Thomas Brandreth, his youngest son, into partnership. It is right that this reference should be permitted here to the history of a firm to which, through Sir Brandreth and his predecessors, English Agriculture is much indebted. The father, Mr. Thomas Gibbs, had previously studied at Kew under the late Mr. Aiton, the Director of the Gardens, and it was he, I am informed, who under Mr. Aiton's supervision re-arranged the Botanic Garden there, and in the year 1799 he was appointed Seedsman to the then Board of Agriculture. Soon after that appointment, by desire of the Board, Mr. Gibbs turned his attention to grasses, especially for permanent pastures and meadows; and he subsequently became a co-labourer with the late Mr. Sinclair in making the investigations and experiments recorded in the *Hortus Gramineus Woburnensis*. Mr. Gibbs's grass garden at Brompton, then stated to have been the most extensive in Europe, was open to Mr. Sinclair, who acknowledges the assistance which he thus received in the edition of his work published in the year 1824. In the same work, Mr. Sinclair, speaking of Kohl Rabi, then a newly introduced crop-plant, says that in 1805 Messrs. Gibbs and Co., Seedsman to the Board of Agriculture, had raised a ton and a quarter of its seed. Of Cocksfoot grass for mixtures to be sold for permanent pastures, he says the seed was first collected in considerable quantities by Mr. Rogers Parker, and by Messrs. Gibbs, seedsmen. Of the Cow-grass, he writes, “All the seeds and plants I had for this, except that from Messrs. Gibbs, which

proved to be true, turned out to be only biennials, never exceeding the third year." Mr. Gibbs was one of the first in England who grew the thousand-headed cabbage, and the kohlrabi, and the white Belgian carrot. The first roots of the Globe Mangolds, both yellow and red, ever exhibited in England, were grown by him in Bedfordshire, and shown at one of the Smithfield Club Meetings, in Old Goswell Street, when the subject of our Memoir was a boy at school. Many other agricultural plants, such as the Giant Sainfoin, *Bromus Schrederi*, and others, were also brought into notice by him; and amongst his co-labourers at that time were Arthur Young, Sir Humphry Davy, Mr. Coke, afterwards Earl of Leicester, Mr. Don the botanist, and others. A large proportion of the great park at Windsor was laid down to permanent grass by the late Mr. Thomas Gibbs, so early in the century that he was then frequently in attendance on George III., who took great interest in his proceedings. Mr. Thomas Gibbs retired in 1847, after a long and successful career, in favour of his youngest son, Mr. Brandreth Gibbs. The father had been Seedsman to the Board of Agriculture since 1797, and the son, then sole representative of the firm, was appointed Seedsman to the Royal Agricultural Society of England in 1844. I mention all these particulars, not only because it thus appears that Mr. Brandreth Gibbs received a training and an education from the outset in the midst of efforts to serve the English agriculturist, but because these facts, now stated almost for the first time, illustrate the quiet modesty of the man. Surely no one with so much to say of his past services, with so much to boast of in his current connection with Agricultural Societies and associations of all kinds, ever made less use of them for his personal advantage.

With this reference to the most direct of all the agricultural services rendered by Sir Brandreth Gibbs, this short Memoir must conclude. No one could have exercised the offices which he held in connection with the Agricultural Society, whether as Honorary Director, President, or Seedsman, in a more perfectly unselfish manner. Entering his office, then in Half Moon Street, Piccadilly, one seemed at once to get out of the atmosphere of hot and almost angry rivalry, feverish competition, contest, push, and strife, from the midst of which many an energetic man has since emerged to take the lead, and by means of which so many others are still rapidly ascending the scale of notoriety and commercial success.

There is little more to add :—A resolution bred of constancy, and tempered by kindness and modesty, directed him, whether as the head of a great seed firm, or as the Director of a great National Agricultural Exhibition. It was in the midst of

threatening illness and suffering that Sir Brandreth accepted the distinguished honour of the Presidency of the Society. On looking through the minutes of the monthly meetings from first to last during his year, at all of which he presided, there is little in the public reports which appears to indicate any active interference on his part. The great machine now moves along on the safe lines which it largely owes to the system and organization in which he had originally so large a share. His thanks on taking office referred with modesty to his past connection with the Society. His thanks on resigning it at Shrewsbury, referred with satisfaction not only to the cordial assistance which he had received from all its office-bearers, but to the prosperous condition in which the Society remained, and to the enactment during the previous year of the Contagious Diseases (Animals) Act, in the passing of which all the members of the Society had so great an interest.

The President of the Royal Agricultural Society of England was the guest of Mr. H. M. Jenkins at its Annual Meeting in 1884, at Shrewsbury, representing the district lying between Staffordshire and South Wales; and the Secretary of the Society thus had the satisfaction of offering that loyalty and hospitality to his former colleague, then his Agricultural Chief, which, but for the President's indisposition, would have been accepted from the late Sir Watkin and Lady Williams Wynn.

Sir Brandreth Gibbs was, as already said, the youngest son of Mr. Thomas Gibbs of Ampthill, Beds, and Brompton Lodge, Middlesex. His mother was Sarah Prosser, daughter of the late Mr. Thoswihan Brandreth, J.P., of Houghton Hall, Beds; and he was thus descended on the maternal side from Sir Edward Atkyns, Lord Chief Baron of the Exchequer, who died in 1784. He was born on the 8th of January in the year 1821. In 1870 he married Catharine Mary, daughter of the late Mr. R. Gibbs Jackson, of Everton, Lancashire, who, with two sons and two daughters, survives him. A long and painful illness, borne with great patience, partly even during the year of his Presidency, terminated in his death on the 2nd of June, 1885. The portrait which accompanies this short Memoir is from a photograph taken in his sixty-second year. It is pleasantly and satisfactorily recognizable.

XXVI.—*The late Sir Watkin Williams Wynn, Bart., M.P.*
A Biographical Memoir. By REGINALD K. MAINWARING,
 of Market Drayton, Salop.

THE subject of this brief Memoir passed away at Wynnstay, near Ruabon, on the 9th of May last, within a few days of the 65th anniversary of his birth. A long and trying illness was terminated by a peaceful death in the country home he loved, and amongst those by whom he was beloved. The late Sir Watkin was the sixth baronet, and was born on May 20th, 1820. The rejoicings throughout North Wales upon this auspicious event were most enthusiastic, to be renewed with equal vigour upon his coming of age and marriage. After schooldays at Westminster, Sir Watkin matriculated at Christ Church, Oxford, whence, after a sojourn of two years, during which time he made some lifelong friendships, he was gazetted to a cornetcy in the First Life Guards, of which regiment the late Lord Combermere was Colonel, and with whose son, the present Viscount, Sir Watkin maintained the most intimate friendship until the day of his death. He remained in the Life Guards until 1843, when he found that his duties as a country gentleman and a Member of Parliament were pressing upon him; but his love for military life did not die out with his retirement from the service. In 1840 the late Sir Watkin's father died, and in the next year his son came of age, and inherited the immense estates, with their cares and responsibilities. As soon as he was of age, he was elected Member of Parliament for the county of Denbigh, as his father and grandfather had been before him, and which he faithfully represented until his death. He was a staunch Conservative, and although his voice was seldom raised in the House, he was generally in his place to give his support to any measure likely to further the interests of the Constitution, or to ameliorate those of the Principality, preferring rather to represent his native county in the House of Commons than to accept the Peerage which was offered to him, and which had also been refused by his predecessors. Perhaps Sir Watkin was best known throughout the country in his capacity as Master of Foxhounds. The Williams-Wynns of Wynnstay have long been fox-hunters, the first Sir Watkin, who was the third baronet, having been killed by a fall from his horse whilst out hunting near Wrexham, in 1749. Sir Watkin's father had kept hounds, but gave them up in 1837; but when his son came of age in 1841, he purchased the hounds of Mr. Leche of Carden, and hunted a very large country four

days a week, at his own expense, until the day of his death. He was exceedingly keen and fond of the sport, and perhaps no hunting establishment in the kingdom was conducted in a more princely manner than was his. His hounds, under the management of John Walker, and subsequently Charles Payne, both masters of their calling, were brought to a wonderful state of perfection; and a few years ago it would have been hard to match the magnificent stud of weight-carrying hunters that stood in the Wynnstay stables. Many and many a time did their keen owner hunt all day, go up to London at night to attend to his Parliamentary duties, and return by an early train next morning to meet his hounds again. Although we do not find Sir Watkin's name as an active supporter of the Turf, he inherited some mares from his father; but a search through the Calendars does not show that he had much taste for racing. He was, however, a member of the Jockey-Club, and entertained a party for Chester and Shrewsbury Races every year. He also took the greatest interest in the Wynnstay Hunt Meeting, held on a beautiful course at Bangor Iscoed, and he annually gave a handsome sum to the Farmers' Races and personally wielded the starter's flag. In the hunting-field he was quiet and good-humoured, and loved to chat with his friends and hear the latest "legend." The writer of this Memoir, who has hunted with him for many years, never heard him make use of bad language, which gives more piquancy to the anecdote told of his visit to a brother M.F.H. After hunting, Sir Watkin said to his host, "Why do you let the field ride over your hounds so?" "Don't they do so with yours?" was the reply. "No," said Sir Watkin. "How do you prevent them?" was the rejoinder. "I am sarcastic," answered the baronet, "What do you say to them?" asked his noble host. (After a pause), "I d—n them."

Perhaps the severest thing Sir Watkin uttered in the hunting field was upon one occasion, when he told a deaf groom (whom he had been calling back, and whose infirmity prevented his hearing) he had "better stay at home and cure bacon." He had a most extraordinary memory and fund of information on almost any subject. His acquaintance with the minutest details of everything in his own neighbourhood and county were astonishing. He took the greatest interest in all matters connected with his tenantry, and had an intimate knowledge of the minutiae of his estate affairs.

His properties, principally in Denbighshire, Merionethshire, and Montgomeryshire, extended to about 150,000 acres, and no tenants were more happy, prosperous, or contented with their lot than Sir Watkin's. In him they had a fair-dealing, just,

and generous landlord, with a kindly word for any in distress, and an encouraging one for any in prosperity.

Yet another anecdote. Sir Watkin, in a round with his agent, saw one farm looking well tilled, and in every way reflecting credit on its occupier. He was pleased with what he saw, and asked his agent if the tenant wanted anything done for him. The adjoining farm was carelessly managed, and was overrun with docks and thistles. This did not escape the eye of the keen-sighted baronet, who told his agent to tell the tenant that if he could afford to grow so many weeds as well as corn, he could afford to pay more rent. Although Sir Watkin was not a pioneer of agriculture, or an experimentalist as a farmer, his home farm at Wynnstay was carried on in a practical and scientific manner, and the Christmas markets at Wrexham and Oswestry every year were supplied with magnificent fat cattle, whilst many were killed at home for distribution amongst the poor. His connection with the Royal Agricultural Society of England dated back forty years, as in 1845 he was elected a Governor. In 1854 he became a Member of the Council, and in 1871 he was Vice-President, and the next year he was President at the Cardiff Meeting. Perhaps there was nothing in his life he was more proud of than being President of the Show when it was held in Wales, and his reception was of a most cordial and enthusiastic nature. He gave a gold cup, value 100 guineas, for the best-managed farm in South Wales, and this munificent prize created a keen and interesting competition.

Whilst Sir Watkin's name will not be quoted as foremost in the van in agricultural experiments and reform, yet he was a valuable member of the Council, and his opinion on any matter before the Society invariably carried weight. No figure was better known in the Royal Showyards than was his, and no member had more at heart the welfare of the Society than Sir Watkin. On the occasion of the memorable Show at Kilburn, he had a large dinner party at his house in St. James's Square. A number of his tenants had come up to London (many, it was said, by their landlord's generosity), and these and almost every friend and neighbour were invited to the dinner. What fun it was! Many could hardly speak English, and many had never been out of Wales before. No wonder that a diner-out, returning from a party the other side of the square, was fairly puzzled when he heard a group of Sir Watkin's guests discussing the dinner, the Show, and the weather in St. James's Square at midnight, and in their own Welsh language, and reported at his Club that a number of lunatics were at large, and using an unknown tongue.

Sir Watkin took a business-like and active part in all matters that he conceived it was his duty to do. He was a Director of the Great Western Railway, and was seldom absent from the Board Meetings. He was a Freemason, and was Provincial Grand Master of North Wales and Shropshire. His love for military life has been alluded to. When the Volunteer movement was first set on foot, he took an active part, and was appointed to command the Denbighshire companies, and a few years ago was appointed Volunteer Aide-de-Camp to Her Majesty, an appointment he always alluded to with the proudest feelings. For many years the Denbighshire Volunteers have been encamped for their annual training in the Park at Wynn-stay, under the eye of their Colonel. He was also for a long period Colonel of the Montgomeryshire Yeomanry. To any public or county business he was always ready to attend. Time, distance, and weather never deterred him when duty called him. One day he would be present as patron of an Eisteddfod; another, he would be presenting prizes at a school or attending the funeral of a departed friend or public man; in short, he was always ready to give his assistance to any meeting for promoting the religious, industrial, social, or educational advancement of his neighbours and fellow-countrymen.

Sir Watkin's position was almost unique, and his extraordinary popularity with all classes causes us to ask, What was the reason for it? It was this: Here was a man of ancient lineage, with a property of vast extent, who resided on his estate and identified himself with the people, and understood their needs. He represented them in Parliament; he was always ready with his presence, his advice, his influence, and his purse, to promote any good project for their benefit and advancement, and this was done in a broad spirit of philanthropy, irrespective of political or religious views. He spared no trouble in carrying out what he conscientiously considered were the duties of his position. Just and generous, wealthy and unassuming, ungrudgingly giving his support to all good works, thoughtful and kind to those in need or affliction, and spending his life amongst those whose interests he had at heart, Sir Watkin gained the esteem of all with whom he came in contact, and this was the cause of his popularity.

Sir Watkin married in 1852 his cousin, Marie Emily, the daughter of Sir Henry Williams Wynn, K.C.B., by whom he had two daughters; the eldest and only surviving of whom is married to Sir Watkin Williams Wynn, seventh baronet and M.P. for Denbighshire, who is a son of the late Sir Watkin's brother, and who has succeeded to his uncle's title.

XXVII.—*Report of the Senior Steward of Live-Stock at Preston.*
 By HUGH GORRINGE, of Kingston-by-Sea.

As the last duty of my Stewardship, it now devolves on me to write a short Report of the Show. I had heard that the ground selected for the Showyard was most suitable for the purpose; but on arriving at the Moor Park on Monday, 13th July, I was quite astonished to find such a charming spot in the midst of so densely populated a district, and could hardly imagine myself in the neighbourhood of a large manufacturing centre. The approach to the Showyard—and in fact the whole town—was ablaze with decorations, floral and otherwise, and the inhabitants evidently were bent on giving the warmest welcome both to the Prince of Wales and the Royal Agricultural Society.

By 9 o'clock on Wednesday morning everything was in readiness, and the Judges having received their instructions from the Steward of General Arrangements, Mr. Jacob Wilson, the judging in the various classes commenced.

The telegraph-boards in the several rings were worked as usual; but in addition to these, boards were placed outside each ring, on which the numbers of the prize-winners were written; so that any one arriving after any of the classes were finished, could see at a glance the awards from the commencement.

The weather in the morning was fine, but before the close of the judging it became very unsettled, and the rain very much interfered with the labours of the Judges in some of the classes.

The attendance on this day was 3557.

Early on Thursday afternoon the Prince of Wales arrived, and was accorded a most enthusiastic reception. His Royal Highness was first conducted to the Working Dairy, and after minutely examining the various details of this department, attended the General Meeting of Members. The attendance was unusually large, the tent being full to overflowing.

After partaking of luncheon in the new Council-room, His Royal Highness was driven to the Grand Stand, and witnessed the parade of horses in the ring, returning on the following day to see the prize cattle paraded, and also the parade of sheep, with which he seemed much pleased.

On Saturday the weather quite broke up; a quantity of rain fell, rendering the Showground very unpleasant for pedestrians, but doing good service to the vendors of waterproof clothing. This was a most disappointing day, as it was confidently expected that a very large number of people would attend the Show, instead of which only 34,307 passed through the turnstiles.

On Sunday, contrary to our usual custom, Divine service was

held in the Yard in the afternoon instead of the morning, but the Marquee was completely filled. A very appropriate sermon was preached by the Right Reverend the Lord Bishop of Manchester, who was listened to with marked attention by all present.

On Monday the weather was much finer, but still the number of admissions to the Showground was insignificant. And it has now become a question whether, unless under very exceptional circumstances, it is wise to alter our day of opening the Show.

Financially it does not seem to answer; and as regards the comfort of those in attendance on the animals, and the animals themselves, it would be better that they arrived on Friday and Saturday—thus having a clear day's rest before the commencement of the judging on Monday. It certainly must be better for those coming from a distance, as, unless they leave home on Sunday, they run a risk of being late on the Tuesday evening, and have no time to get their cattle in order.

On the whole the Show of Live-stock must be pronounced a good one, the number of entries being considerably beyond the average, though there were several absentees.

But inasmuch as the Official Reporter, Mr. Jabez Turner, is writing a detailed account of all the Horses, Cattle, Sheep, and Pigs, and the Judges in the several classes have all sent in their Reports, it is quite unnecessary for me to remark on them at all.

To the Local Committee great praise is due for their strenuous exertions to render everything connected with the Show as perfect as possible, while the Mayor and Corporation were most hospitable in the entertainment of the President, Council, and Officers of the Society.

A word of praise too must be given to the Railway Companies for the expedition with which the various exhibits were delivered into the Showyard.

The whole arrangement of the Yard was admirable, and, considering the narrowness and length of the ground, it could not have been better laid out.

The new horse-boxes were a decided improvement on those of former years, and were much appreciated by exhibitors.

The new buildings erected in the centre of the Showground, for the Members, Council, and Stewards, were a great success; and the grouping of all the offices together considerably enhanced the comfort of all concerned. The buildings reflected the highest credit on the Society's Superintendent of Works—Mr. Bennison—not only for their practical utility, but also for their artistic design.

Before I conclude this brief and imperfect Report, I must thank the President, my brother Stewards, and all officially connected with the Society, for their courtesy and ready help at all times, and I must also thank the Assistant-Stewards, who worked so well and so willingly, and lightened in a very great measure the duties of my office.

I much regret that my four years are ended, and I shall always look back with real pleasure to the period of my Stewardship of the Royal Agricultural Society.

XXVIII.—*Report on the Exhibition of Live-Stock at Preston, 1885.* By JABEZ TURNER, of Horsington, Horncastle.

THE Senior Stewards of Departments will doubtless in their valedictory addresses place before the readers of the 'Journal' accounts of the accessories which combined to make the Country Meeting of the Royal Agricultural Society of England at Preston so decided a success. From them may be gathered the record of Royal progresses, episcopal admonitions, guild festivities, and picturesque surroundings; with last, but by no means least, of a well-furnished exchequer. To the Official Reporter remains the more prosaic task of presenting the awards of the Judges, with his comments thereon, in such guise as may induce the perusal of a paper so eminently uninteresting to any but exhibitors, of whom, however, there are a goodly number. To recount this more than "thrice-told tale" in language which shall not be repetition, presents a difficulty which increases yearly, the theme having been previously treated with great ability. Before entering on the domain of live-stock criticism, it may be remarked that the arrangements of the Showyard were of the perfect nature which characterises the management of the Royal. Yet the great extent and somewhat elongated form of the ground caused the Yard to lack the compactness noticeable on many former occasions; and lamentation was heard from wayworn visitors, one of whom remarked that if Royal Shows were designated by their attributes, like American cities, Preston would be remembered as the Yard of "magnificent distances." Should the Showground attain such dimensions in future, tramways might be made available on some of the main avenues; and, in addition to exhibiting any improvement in a system which is becoming of such general application, would render aid to weary pedestrians, whose powers and training do not fit them for undertakings of such magnitude as treading the mazy circuit of such a Show as that at Preston.

Judging commenced at nine o'clock on Wednesday morning, July 15th, under "a southerly wind and a cloudy sky." Rain, however, kept off until the afternoon, when one of the violent showers which seem natural to the Country Meetings converted the Moor Park for a time into a howling wilderness, driving all to shelter who could obtain it, and rendering the task of judging in some of the Hackney Classes difficult and disagreeable.

Careful examination of the animals exhibited, and candid comparison with Exhibitions of past years, lead to the following conclusions.

In comparing the number of entries of live-stock at the different Country Meetings for the term since 1877, omitting the abnormal display at Kilburn in 1879, it will be seen that the Preston Show in its entirety reached quite an average, the number there being in excess of Reading, Derby, Carlisle, and Bristol, but slightly inferior to York and Shrewsbury. The presence of nearly 200 extra horses at York, and the large entry of Hereford cattle and Shropshire sheep at Shrewsbury, raised the entries to 1685 and 1687 respectively, the latter being the largest number shown in the period indicated.

**STATEMENT of ENTRIES for the PRESTON MEETING in JULY, 1885,
compared with SEVEN PREVIOUS YEARS.**

NUMBER OF ANIMALS IN STOCK-YARD.

	Preston, 1885.	Shrewsbury, 1884.	York, 1883.	Reading, 1882.	Derby, 1881.	Carlisle, 1880.	London, 1879.	Bristol, 1878.
Horses ..	438	407	611	239	256	487	815	350
Cattle ..	539	579	462	598	392	434	1007	443
Sheep ..	433	490	412	442	414	434	841	397
Pigs ..	203	211	200	188	167	146	211	164
Total ..	1613	1687	1685	1467	1229	1501	2874	1354

HORSES.

The show of Horses was superior in number to many previous Exhibitions, but it must be admitted that this department does not attain the pre-eminence which the title of the Society implies, as the numbers shown were exceeded this season at the more recently established Show at Peterborough, where there were 484 entries, and at Glasgow, where more than 500 appeared. On comparing the lists of Preston, Shrewsbury, and York, it will be seen that York much ex-

ceeded Preston, whilst last year some fewer horses competed. It has been alleged that the duration of the Show has something to do with the paucity of entries; and certainly a week seems a long time for sensitive and valuable animals in a somewhat unnatural state of bodily health to remain under canvas in the weather which usually distinguishes the week of the Royal Show. No cart-horse stallion was shown this year more than three years of age,—an alteration of great importance, as it prevents the appearance of aged and probably effete animals, whilst giving every opportunity for the exhibition of promising young horses in the full beauty and vigour of youth.

The Catalogue of Live-stock commences with the First Class for "Shire or Agricultural Stallions" (not qualified to compete as Clydesdale or Suffolk) "foaled in the year 1882." This heading has been the cause of great searchings of heart amongst the members of the Shire Horse Society. In 1882 the schedule was headed "Agricultural Stallions," and then included the newly enrolled horses of the Shire Horse Stud Book. In 1883 the first class stood as "Shire Stallions" up to seven years old, and separate classes were accorded to "Agricultural Stallions." This arrangement was continued in 1884, when the classes for non-pedigreed animals were badly filled, and only seventeen horses were entered to compete for 85*l.* of prize money; the quality of these also was by no means remarkable, and it was thought better to discontinue the classes. This year, in order not entirely to shut out exhibitors of horses of this description, the owners of which for some reason or other have not qualified for the Shire Horse Stud Book, the Council have reverted to the original style of entry, thus producing a sort of "*olla podrida*," very unacceptable to owners of Shire horses; and grievous murmurs of discontent have arisen, especially as the heading concludes in the old form of "not qualified to compete as Clydesdale or Suffolk," which seems to convey an additional stigma. An examination of the Catalogue will, however, lead to the belief that the grievance is more imaginary or sentimental than real, as the entries show that only three out of the fifty-six stallions in the three first classes are not pedigree sires. In no case was a prize given to these unpedigreed ones, and all the foals in Class 4 have handles to their names in the shape of the numbers appertaining to their respective progenitors.

SHIRE OR AGRICULTURAL

Stallions not qualified to compete as Clydesdale or Suffolk, foaled in the year 1883.—In this, the first Class in the Catalogue, 13 appeared, 1 being absent. The Judges were some time engaged

in determining their relative positions, and at length placed Mr. Maitland's "Rufford Champion" first. This horse is from Ormskirk, bred by the exhibitor, sire the well-known "Bar None," and the dam by that grand horse, "Honest Tom;" and the decision was subsequently endorsed by the award of the Champion Prize of 25*l.*, given by the Shire Horse Society for the best Shire Horse Stallion. He is a grand bay, of immense power, great bone, and fine feather; but his joints are somewhat coarse, and he does not compare favourably with previous champions—notably the handsome "King Charming" of last year, although that horse was then a year younger. The second prize also went to Lancashire for "Trajan," the fine bay belonging to Mr. Thomas Shaw. He is more compact, with shorter legs, and shows much substance and quality. Next to him was the Norfolk horse, "Gracchus," shown at Shrewsbury, and also successful at the Shire Horse Society's Show, being there third in a strong class. He is a fine chestnut, with good looks and action, but of somewhat less power than the winners. "M. M.," the reserve number, another Lancashire horse, was much admired. He is by "Honest Tom," the grandsire of the Champion, and shows evident marks of his breeding. The strength of the Class may be inferred from the fact that the Hon. E. Coke and Messrs. Freshney only succeeded in reaching the highly commended places for their well-known horses, "Corsair," and "Sir Garnet;" and Mr. Wareing was commended for "Farmer's Friend," Lancashire bred—the success of the "home county" in this Class being thus very noticeable, and the breeding of all the ticketed horses being vouched for in the Stud Book of the Shire Horse Society.

A grand Class of Two-year-olds appeared—23 entries, 4 absentees; and the winner turned up in Lord Ellesmere's "Western King," bred by the same breeder as "Trajan," the second-prize horse in the First Class. This Lancashire horse, a superb chestnut, is by "What's Wanted," a sire whose name is becoming a "household word" in the prize-ring; he is of fine scale, grand limbs and feather, moves well, and promises to grow into a magnificent horse when fully furnished; he was Reserve Number for the championship. Second to him was "Jolly Boy," a Welsh black, of compact and squarely built form; the third is also black, from Yorkshire, bred on the dam's side from "What's Wanted," a very powerful well-moving colt; and the reserve went to Mr. G. Street, for his handsome "Maulden Primus," a well-furnished, stylish colt, with admirers who thought that his position should have been higher; another of "What's Wanted" stock, "British Flag," was highly commended; and Lord Egerton, of Tatton, showed a fine colt—

bought at Elsenham—"Bluebeard," by "Spark," which secured a commendation. The Hon. E. Coke's "Charlatan," Mr. Shaw's "Senator," and Mr. Cronshaw's "Cleville" in the Class were shown as Yearlings in 1884, but did not succeed in obtaining notice at Preston.

Nineteen Yearlings were entered; but although there were 6 absentees, the remaining youngsters formed a class of much promise. The Earl of Ellesmere brought from his fen farm "Shrewsbury," by his "Esquire," the dam being his last year's first-prize mare, "Darling," by "England's Glory." The value of this fine pedigree was fully borne out by the appearance of the winner, a very compact colt, which was nearly equalled by the second, "Embassy," also belonging to his Lordship, and which will probably run his rival more closely in future when he becomes more fully developed. A Yorkshire colt, "A 1 Quality," by "Bar None," and of "What's Wanted" blood, took the third prize, and is of great promise; "Hopeful," belonging to Mr. Bury, of Huntingdonshire, was reserved and highly commended, but lacks the quality so conspicuous in the winners.

The next, a very interesting class, consisted of Colt Foals, the produce of the "Shire and Agricultural" Mares in Class 13. This prize, given by the Preston Local Committee, was offered according to suggestions made from time to time—that foals should compete with each other, leaving their dams to stand or fall by their own merits. The first prize, a magnificent Lancashire-bred foal of Mr. Lawrenson's, is the produce of his fine old mare, "Brock," by "Ploughboy," and is sired by "Lincoln," thus being own brother to the Hon. E. Coke's "Chance." The mare did not succeed in attracting the favourable notice of the Judges; but the excellence of her progeny was very evident. It was stated that this fine foal was sold for a large sum for service in Lincolnshire; others, again, were of opinion that Essex will probably be the district in which he will eventually be found. The second and third-prize animals are good; but this was a class in which the winning was easy, and Mr. Charnock and Mr. Williamson's foals are more on a par with each other than with the winner. The reserve is a pretty foal, belonging to Mr. Singleton, out of the second-prize mare; and Mr. W. Gilbey was commended for "Weston Wonder," from his "Fences Metal," Norfolk-bred.

It is now necessary to deviate from the order of the Catalogue, as the Classes for Horses there follow sex instead of sequence, and the Reports of the Judges, necessarily confined to each breed, could not otherwise be arranged in their places in a collective report.

"Shire or Agricultural Mares, each with foal at foot." The

efforts of the Council to promote this most important section of the Horse Classes was well responded to, and 26 entries, 2 absent, formed an array such as is seldom seen, and, quality being taken into consideration, this class has probably never been surpassed. Several fine animals were of necessity passed over, and, after examining the parade, it became evident that about half-a-dozen were specially noticeable; the result, which placed first Lord Ellesmere's brown mare, "Lady Lincoln," six years old, bred in Derbyshire, by "Lincolnshire Lad," was fully endorsed by the public. This fine animal may be stated to be as good as her position requires, combining the bone, substance, and strength of the cart-horse, with a quality seldom seen, and a general appearance unequalled. She was followed by a fine filly-foal, somewhat darker in colour than its dam, which deservedly took the first prize in its class; and the pair conjointly were a very noticeable feature in the horse-parades. An extremely good bay, Mr. Singleton's "Smiler," seven years old, by "Sir Colin," was placed second, and with a handsome colt-foal by "Garnet," reserve in Class 4, found many admirers. Hon. E. Coke's "Comfort," Derbyshire bred, and winner on many previous occasions, showed somewhat to disadvantage, the cares of maternity having told more on her than on her more matured rivals; she has a very neat filly-foal by "Charter," second prize in its class. The Earl of Ellesmere's fen-bred "Blossom 2nd," by "Thumper," of Whittlesea fame, took reserve. She is of grand substance and cart-horse character, but wants the style and finish of the prize animals. Her filly-foal by "Gay Spark," somewhat smaller than others in the class, did not obtain notice. A good Lancashire mare of Mr. Jackson's, "Bessie," dam of the third-prize filly-foal, was highly commended in this, the most interesting class of the Horse department of the Show.

In the Class for Shire or Agricultural Fillies foaled in 1882, 9 fine animals appeared, 3 being absent. Lancashire was again to the fore with Mr. Miller's well-bred "Missing Link," sired by "Lincoln," dam by "Honest Tom." She is low and wide, with fine coat and feather. She took third prize at the Shire Horse Society's Show, and was here unquestionably winner. Lord Ellesmere's lighter-boned "Nectar," bred in Leicestershire, and Mr. Teasdale Hutchinson's useful Yorkshire chestnut, were placed before Mr. Miller's "Moulton Gem," a powerful Lincolnshire filly, reserve and highly commended. Two other commendations were given, and the class, although small, was certainly strong in individual merit.

A larger Class of Two-year-old Fillies appeared; there were 20 entries, 5 being absent. The premier prize went to

Lord Wantage's well-known "Glow," which does not appear to improve much with age. It will be remembered that she was purchased at the Elsenham sale from Mr. Walter Gilbey, and swept the prizes for fillies at Islington in February last. Messrs. Waring and Brothers took second for a Lancashire-bred filly, "This is her," sire "What's Wanted;" her dam, "Smiler," was shown in Class 13, No. 141, but was not noticed in the prize-lists. Next to her came the Hon. E. Coke's "Comet," by "Spark," developed into a big mare, somewhat short of quality. The reserve, "May Blossom," of Mr. Holmes, a home-bred filly by "Waring's Wonder," with very fine quality of bone and hair, was by many preferred to some placed higher. The strength of the class was shown by highly commended cards being given to five other competitors; and the contest was keen, very slight shades of difference being observable in many of the mentioned animals.

The Class for Yearling Fillies was also large, as far as entries were concerned, but weak in actual numbers, 8 being absent out of 21. The quality of those appearing was not so pronounced as in the preceding class. Lord Winmarleigh won with a grand filly by "Garnet," beating Mr. Miller's chestnut by "Mepal Samson." This Thorney Fen filly was purchased at the sale of Messrs. Horrell in August last, and her success was considered a certainty; she was narrowly beaten by the somewhat superior condition of the winner. The third prize, a grey of Lord Ellesmere's, from Chatteris, was not so forward as either of the others, but showed fair promise. The difference between "top and tail" in this class was very marked, the winners and commended fillies being much superior to the remainder.

In the Filly Foals the prize-takers have already received mention in the record of their dams' doings, the first being the produce of "Lady Lincoln," the second of "Comfort," and the third of "Bessie," proving at all events the truth of the axiom that "like produces like."

The next and last class for this breed was that for Mares alone without Foals, and here the Hon. Mr. Coke's "Chance" was a good one, taking, as might be supposed, the first prize easily. Two six-year-old mares, Mr. Milne's "Daisy" and Mr. Kirkham's "Flower," closely contested the second prize, with but little difference between them. The reserve, Mr. Trotter's North country "Meg Moir," showing much bone, with general massiveness and power, and the Norfolk-bred "Topsy," were highly commended in a not numerous class of good mares in splendid condition.

The number of Shire or Agricultural Horses was 170, divided

as follows:—stallions 56, colt-foals 13, mares with foal at foot 26, mares alone 9, fillies 53, filly-foals 13; and this somewhat extended and detailed notice of the breed is rendered necessary by the non-delivery of the Judges' Report on this section of the Show until September 18th.

Report of the Judges on Shire and Agricultural Horses.

CLASS 1. *Shire or Agricultural Stallion foaled in 1882*, 14 entries.—First prize we awarded to No. 10 (and also the Champion prize, as the best Shire Stallion in the Showyard); an exceedingly nice bay, on good short legs, splendid back, quarters, and ribs, all over a sire of superior merit. The second prize went to No. 9, a bay with good bone, grand legs and feet, a beautiful mover; third prize to No. 4, a powerful chestnut; we also highly commended and reserved, No. 6; highly commended, Nos. 1 and 3; and commended, No. 13.

CLASS 2. *Shire or Agricultural Stallion foaled in 1883*, 23 entries.—First prize we awarded to No. 34, a powerful chestnut, with grand legs, good feet and pasterns; second to No. 18, a black of great promise, beautiful hair, good legs and feet, with bone of superior quality; third prize to No. 19; reserve and highly commended, No. 32; highly commended, 23 and 30.

CLASS 3. *Shire or Agricultural Stallion foaled in 1884*, 19 entries, 6 of these absent.—First prize to No. 53 (and also reserve in Champion Class), a bay with good legs, feet, and pasterns, a good mover; second prize to No. 51, a bay with good bone, likely to develop into a grand horse; third to No. 40, a chestnut, with beautiful feather, a nice mover, has good feet and legs; reserve and highly commended, No. 55, a powerful brown.

CLASS 4. *Colt-foal, the produce of Mares exhibited in Class 13*.—First prize went to No. 127; second to No. 136; third to No. 135; reserve and highly commended, to No. 133; and highly commended, to No. 142.

CLASS 13. *Shire or Agricultural Mare*, 26 entries.—Strong competition in this Class. We awarded first prize to No. 145, a great good mare, with immense power, good legs, pasterns, and feet, a most valuable brood mare; second prize to No. 133, a good mare, and moves well; third prize to No. 125, a four-year-old mare, likely to prove valuable at the stud, showing bone and quality of high order; highly commended and reserve, No. 144; highly commended, No. 139.

CLASS 19. *Shire or Agricultural Filly foaled in 1882*, 12 entries.—We awarded first prize to No. 192, a bay with good back, ribs, and quarters, on short well-formed legs; second prize to No. 198; third prize to No. 199; reserve and highly commended to No. 191; and highly commended to Nos. 195 and 197.

CLASS 20. *Shire or Agricultural Fillies foaled in 1883*, 20 entries.—An extraordinary Class; amongst those not obtaining a prize were many animals of great merit, and we had much pleasure in highly commending the whole Class. The first prize we awarded to No. 212; second prize to No. 214; third prize to No. 204; highly commended and reserve to No. 210. We have no hesitation in saying that this was one of the best Classes ever seen in a Showyard.

CLASS 21. *Shire or Agricultural Filly foaled in 1884*, 21 entries.—First prize we awarded to No. 222, a bay, with good legs and feet, good action and size; second prize to No. 226, a beautiful chestnut with fine back and quarters, and a profusion of leg feather; third prize to No. 235, a grey, of bone and rare quality, apparently a late foal; also highly commended and reserve to No. 121; and highly commended to No. 225.

CLASS 22. *Filly-foal, the produce of Mares in Class 13.*—First prize to No. 145; second to No. 125; third to No. 139; reserve and highly commended, No. 141; highly commended, No. 131; commended, No. 126.

CLASS 27. *Pairs of Draught Horses.*—First prize to No. 272, a grand pair of bays; second to No. 271.

CLASS 28. *Draught Geldings foaled previous to 1881.*—First prize to No. 277, a bay, 4 years old, of immense power, good legs, pasterns, and feet, all over a grand gelding; second prize to No. 278, a six-year-old, of great power; the third prize to No. 276, a four-year-old of great promise; reserve and highly commended, No. 274.

CLASS 29. *Shire or Agricultural Mare foaled previously to 1881, not having a Foal at foot.*—First prize to No. 279; second to No. 282; third to No. 287; reserve and highly commended, No. 286.

JAMES R. BLACK.

HENRY SMITH.

CHARLES WADLOW.

CLYDESDALES.

These North British horses came to Preston in good numbers, 64 entries having been made in six classes against 54 at Shrewsbury, 56 at York, and 84 at Carlisle, this last doubtless on account of the proximity of that city to the district in which they are held in such high estimation. Many of those shown at Preston are of great beauty and power, notably the first-prize stallion in the Three-year-old Class, "The Macneillage," belonging to Lady Ossington, which worthily repeats his last year's victory as a two-year-old at Shrewsbury; for power of limb and great strength, united with considerable activity, he well deserved his position at the head of the handsome white faces which were displayed by nearly all shown; he is by "The Macgregor," first-prize two-year-old at Carlisle, and winner again at Derby. A horse of Mr. McCowan's, "Scotch Pearl," of very stately appearance, with an enormous crest for his age, was placed second in a class of seven, with six appearances. The next class, a very strong one, for Two-year-old Stallions, was headed by the grand colt "Claymore," belonging to Lords Arthur and Lionel Cecil, already winner of many first-prizes, and "with power to add to their number"; he is also by "The Macgregor," and has fine style, beautiful feather, with great substance, and all the elasticity of pastern and movement which distinguishes the Clydesdale. The second-prize colt, another "Macgregor," "Little Jock Elliott," as his name implies, seems capable of taking care of himself in any company; he is at present a little lower in condition than "Claymore," and will probably cause that horse trouble in future encounters, being of somewhat stronger build. Lord Strathmore's horse, placed third, is smaller than the two winners, and appeared somewhat to a disadvantage. The Yearling Colts had a fine example in Mr. Park's, from Renfrewshire, which was much ahead of his competitors. The Duke of Portland was

placed second with a mealy roan of heavier style, which seemed somewhat deficient in dash as well as colour. Many preferred the third-prize colt, Mr. McCowan's "Newtonairds Yet," by "Macgregor," as of better style, type, and quality. In Clydesdale Mares and Foals ten were entered, but only six were shown. Lord Ellesmere's "Flower Girl," a four-year-old of great beauty and substance, with a coat and feather of fine black, was deservedly first. "Dora," the Marquess of Londonderry's, is of weaker character; and the curiously coloured "Milkmaid" was by some thought the better animal. The Three-year-old Fillies were headed by one of the best movers seen for many seasons, Lords Arthur and Lionel Cecil's "Cornflower," by "Lord Lyon"; second to her was "Lily," from Seaham, a handsome but weaker filly, beating a Hertfordshire bred one in a good class of 11 entries. Eleven were also entered in the Two-year-old Class, but only 8 appeared; and Lords Arthur and Lionel Cecil gained another victory with "Edith Plantagenet," a filly of fully Clydesdale character, the Duke of Portland showing the second- and third-prize animals, of which the latter seemed somewhat deficient in the points of the breed. The very complete and interesting Report of the Judges of Clydesdales deals so fully with the merits of the different prize-takers, that but little is left to add, save that the Show fully sustained the reputation which this handsome and active variety of cart-horse has gained.

Report of the Judges of Clydesdale Horses.

CLASS 5. Three-year-old Stallions.—Was a good class, almost all the animals in it being creditable specimens of the breed, several of them very much so. The first-prize horse, No. 59, is very gay and stylish-looking, his action being excellent, and his fore-legs and fore-feet unusually good. No. 58, the second-prize horse, has less substance than the first, and he is not so good a mover, but he is full of quality. The third horse, No. 62, is strong, big, and stylish, but he is slightly lacking in quality, and hard in the hair. The reserve horse, No. 61, shows good quality, but he is a little too light in the bone.

The *Two-year-olds* in CLASS 6 were really good as a class. The first-prize horse, No. 69, is a very just and promising colt, showing true Clydesdale characteristics. The second-prize animal, No. 67, is a big grand Clydesdale, with beautiful hair, but it would have been improved had its fore-feet been wider. The third-prize colt, No. 64, is a nice animal, but is not equal in strength and style to the two animals placed before him. The reserve and highly commended colt, No. 76, appeared at a disadvantage from being obviously out of bloom, but he possesses excellent qualities and true Clydesdale character. A commended ticket was given to No. 65, a nice useful colt.

CLASS 7.—The Yearling Colts were very good as a class. The first-prize one, No. 87, is full of quality, indeed he is good in every respect, though slightly hollow in the back. The second prize was awarded to No. 84, a strawberry roan, not a favourite colour for a Clydesdale. He is a grand strong colt, possessed of extra good fore-feet and legs, and showing much quality. The third-prize colt, No. 81, appeared somewhat out of bloom. He is a

strong symmetrical colt, and a good mover, but a little short in his fore-pasterns. No. 86 was awarded the reserve number and highly commended ticket; he was poor in condition, but possesses very good fore-feet and pasterns, and other qualities, which make him very promising. Nos. 83 and 85 were commended—the former is a good useful colt, though his hair is a little hard, and he is slightly faulty in his fore-feet; the latter is low in condition, but appears as if in time he will make a good colt.

CLASS 14—*Mares with Foals at foot*—was a very good one. No. 157 was easily first; she is a splendid mare with extraordinary action. No. 162, placed second, has also grand true action, though a little bare in her hair, and perhaps not quite heavy enough in bone, but still a beautiful mare. The mare placed third, No. 161, is an excellent type of a Clydesdale brood mare, though age is telling against her. The reserve and highly commended mare, No. 154, is a useful-looking mare.

The *Three-year-old Fillies* in CLASS 23 were a very good lot. The first one, No. 245, is remarkably well made up for her age, her action is grand and her quality excellent, but she is not quite so good along her top as elsewhere. The second, No. 250, is full of quality, with extra good fore-feet and pasterns, but a trifle light in her middle. The third, No. 243, ran the second very close, though not so good in her action; she is handsome, and likely to prove a good brood mare. No. 246 was awarded the reserve and highly commended ticket; she has vast substance and excellent Clydesdale character, but is not so good in her fore-feet as in other respects—a weakness also shown to some extent by No. 249, which was commended. The other filly commended, No. 251, is a capital mover, but was out of Showyard bloom; she may yet come out well.

The *Two-year-old Fillies* in CLASS 24 formed the best class of Clydesdales of either sex in the Showyard, there being a larger proportion of splendid animals in it. The first three were very evenly matched, a remark, indeed, which applies to several of the other classes. The first-prize filly, No. 258, is a grand, massive, symmetrical animal, her movement is remarkably good, her hock action being specially excellent. Though the second, No. 261, has less substance, she is full of quality, her hocks are not quite so perfect as most of her other points. The third prize was awarded to No. 260, which has more substance than the second, and is in every respect a grand filly, her chief drawback being that her hock action is a trifle wide. The reserve and highly commended, No. 259, has excellent bone and hair, but her fore-feet are deficient in size; a commended ticket was given to No. 252, a filly of good stamp and quality, though light in her bone and bare of hair.

In regard to the turn-out of Clydesdales, as a whole, we are gratified in being able to report that alike in respect of numbers and merit, they are the best display of the breed ever made at a Show of the Royal Agricultural Society of England, compensating the Society in this respect for their liberality in offering so many handsome prizes in half-a-dozen classes. While the leading prize-takers were exceptionally superior, a large proportion of the exhibits were possessed in a creditable degree of the strong, flat, flinty bone, the excellent feet and pasterns, and the free stylish action, which are distinguishing characteristics of the breed, and which are serving to recommend them to foreign as well as home fanciers of draught horses.

JAMES McQUEEN.
DAVID ALSTON.

SUFFOLKS.

Horses from the confines of the German Ocean could not be expected in great numbers on the verge of the Irish Sea; how-

ever, 21 entries of the Suffolk breed were made, and all but three appeared. The merits of this breed are so well known, and have been so frequently described, that but a short notice is necessary. Seven fine stallions, in the Three-year-old Class, were headed by "Dreadnought," undoubtedly the best, Mr. Kent getting second with "Marshman," between Mr. Wolton's two horses. A fine colt, of great power and very active, headed the Class for Two-year-olds; he is by "Tiptop," belongs to Mr. Horace Wolton, and will probably be heard of again; a neat colt, also from Woodbridge, was second. A good mare, with a nice foal, showed alone in the Class for Matrons, and got the first prize for her owner, Mr. Wilmot; and the three-year-old fillies of Mr. Austin, and the Duke of Hamilton's two-year-olds, are good specimens of a breed, which, despite its undeniable usefulness, does not spread much beyond the limits of East Anglia, at the metropolis of which the next Country Meeting of the Society will be held.

DRAUGHT HORSES.

A handsome prize, offered by the Preston Local Committee, for a pair of draught horses (mare or gelding), any age or breed, was won by the Earl of Ellesmere with two splendid bay mares, five years old, shire bred, beating the Duke of Hamilton's handsome Suffolk chestnuts, one of which is much older. Another prize, given by the same authority for a single draught gelding less than four years old, was won by a wonderful horse belonging to the Hon. Mrs. Meynell-Ingram, which is one of the finest specimens of the English dray-horse ever exhibited; he is by "Stonton," sire of one of the winning mares in the preceding Class—a horse well known in the Midlands,—and was well placed before the six-year-old Cheshire-bred "Robin" of Mr. Cronshaw, although the latter is a very strong and evidently valuable animal. This was the last Class in the Catalogue for Cart Horses, and it will be found that entries under that denomination numbered no less than 262, divided as follows:

Shire or Agricultural	170
Clydesdales	64
Suffolks	21
Draught horses, any age or breed	7
	262

There were many absentees in this as in other departments of the Show, but these will be more fully dealt with in the conclusion of this Report.

Report of the Judges of Suffolk Horses.

The Judges wish to express their regret that the old Stallions are prohibited from competition; they also further regret that so few Suffolk horses have been in competition, which, however, may be accounted for by the distance from their native county.

CLASS 8.—Nice class; three very good colts.

CLASS 9.—Good class; four nice animals.

CLASS 15.—Only one entry, for which it was thought right to give the first prize.

CLASS 25.—Poor class; only two sound animals.

CLASS 26.—We recommend the second prize to be given.

D. A. GREEN.

R. H. WRINCH.

THOROUGHBREDS, &C.

The section of the Show devoted to the exhibition of horses for purposes of travel, pleasure, or State, is very considerable, and the Catalogue contains no less than 161 entries, divided as follows: Hunter, Hackney, and Pony Stallions and Mares, 45; Hunters of different ages, 70; Hackneys, &c., of different sizes and ages, 46; the apparent discrepancy between the sum-total of this statement and the Catalogue numbers is accounted for by the fact that the Shire and Agricultural Foals, although competing for prizes on their own account, have no separate numbers from their dams.

The show of Thoroughbreds commenced with Class 10, "Stallions suitable for getting Hunters." The prize of 50*l.*, offered by the Society in this Class, was augmented by the same amount given by the Borough of Blackpool, thus making a prize well worth competing for. However, it only produced 9 entries, one being absent. The well-known "Knight of the Launde," Yorkshire bred, but now located in Lincolnshire, added a "Royal" to his list of provincial victories, having been placed before the good-looking, free-moving, brown "Pedometer," belonging to Mr. Walter Gilbey. The latter horse is by "King Tom," and found many admirers; he was placed before "The Knight" on the occasion of their meeting at Islington in March last. The winner is a fine bay, of much quality and substance, but does not compare favourably with last year's first-prize Stallion in this Class. A lighter framed Scotch horse, "Boycott," was third in a Class in which quality combined with strength was not remarkable. The sons of "Blue Gown" and "Kisber" did not appear equal to their parentage. In the Hunter Mares and Foals a very strong Class appeared, although but 5 competitors were present. Mr. Teasdale Hutchinson's fine old mare "Achievement," with a handsome foal by "Macaroon," was well placed first; she is a very powerful bay with

grand shoulders and quarters, and essentially a weight-carrier. The second-prize mare, Mr. Kitchen's good brown "Bondmaid," is also from Yorkshire, and showed much strength and quality. The third prize went to a mare, fifteen years old, by "Vultigeur," from the Aske Hall stud; the reserve and highly commended, a nine-year-old, by "Mowbray," had many friends who thought that she might have taken a step or two higher on the prize-list, as she beat "Achievement" at the Yorkshire Society's Show last season. All the animals shown in this class may be stated to be "over average" as to quality, and the Judges commended the class.

The weight-carrying Hunters were headed by a horse from Scotland, Mr. Alexander's "Grenadier," which might have been more appropriately termed "Scots Grey;" he is a fine goer, especially in galloping; and with his splendid back and quarters, good arms and thighs, with flat legs to match, really seems to be what he professes, i.e. up to 15 stone across any country. This fine horse took the second prize in his class at Shrewsbury. He was closely followed by a handsome chestnut, "Gamester," capable of fulfilling the conditions of entry; and a very tidy and pleasantly moving grey, Mr. Hollis's "Snowstorm," took third place. "Lord Penzance" and "Supervisor," fine powerful animals, were highly commended in a class reduced by absentees to 10 appearances.

In the 12-stone Hunter Class only half the entries appeared, and those, with the exception of the first and second-prize horses, were not of any great degree of excellence. The nicely moving but somewhat unruly "Carabineer" of Mr. Russel, was placed before another Scotch horse, "The Vauban," a very taking animal, which evidently had the advantage of very careful training. The Judges also gave the third prize, and awarded a highly commended card, in the class of 5 competitors. The Class for Four-year-old Hunters was unusually indifferent, Mr. A. J. Brown's Irish gelding by "Zephyrus" being far away the best. The second prize went to the Western bred "Spic and Span," belonging to Mr. Lett, a horse of coarser character, with not many characteristics of a high-class hunter.

The Class for Three-year-old Mares or Geldings was much better; a very nice young horse from Northumberland, "Dauntless," of long, low character, won against the Lancashire "Sam," of Mr. Taylor; and a third from Westmoreland was thought by many to very nearly equal the winners. This colt, "Clarion," showed much style and strength, and his movement was quite as good as that of either of his lighter competitors. Fifteen Two-year-old Hunters appeared out of 18 entries, and amongst them were several horses of promise. "Sheraton," by

"Gladstone," Mr. Stephenson's, placed first, was much approved, many critics considering him equal if not superior as an all round hunter to anything shown. Another Cumbrian colt with fine limbs and movement, Mr. R. Percival's "Harmonium" (surely an ill-omened name), got second, although suffering from the effects of a slight accident. A very neat brown gelding, by "Carthusian," from Carnforth, completes a trio of unusual excellence, but he is not equal to the two placed above him. The Judges commended three, and highly commended the reserve No., Mr. A. J. Brown's very good-looking Irish bay colt.

Report of the Judges of Thoroughbreds and Hunters.

CLASS 10. *For Thoroughbred Stallions.*—The entries in this class were not so numerous as we should have thought the amount of money given would have produced. No. 105 is a short-legged horse, with plenty of power and good quality, and seems well adapted for getting weight-carrying hunters. No. 110 is an elegant horse and a good mover, but deficient in substance as compared with the first-prize horse. These were the only two horses which we considered thoroughly suitable for the purpose for which they were shown.

In CLASS 16, No. 170 was easily first, and a capital stamp of animal for the purpose for which she was exhibited. Five animals only were exhibited in this class, four of them being really good ones, and the class was commended.

CLASS 30.—The entry was small, but comprised several animals well known in the Showyards. No. 291, the winner, is a fine mover, and the stamp of what a weight-carrying hunter should be. The second prize, No. 293, is a fine animal, and has good limbs and action.

CLASS 31.—The first prize went to No. 303, a perfect gentleman, and looks like seeing the end of many good runs. No. 304 is a fine mover, and looks like a hunter.

CLASS 32—*Four-year-old Hunters*—was decidedly a weak one. The winner, No. 324, is a useful short-legged horse, and a good mover, likely to carry a heavy man; and the second-prize horse, No. 319, is a good coloured horse, and as much of a harness horse as a hunter.

CLASS 33 was a decided improvement on the previous one, and included some very promising youngsters. No. 329 was a long low-level colt of the old-fashioned sort, and a fine mover. No. 340, the second-prize horse, was perhaps a trifle light of bone, but a very fine mover and beautiful quality of horse. No. 338 was also a very useful animal, of good quality.

CLASS 34 also contained several youngsters which are likely to grow into good horses. No. 356 is a level true-made horse, with good limbs, and moved uncommonly well, and looked like having a successful career. No. 358, who was second, had a cut on his near fore-leg, which was a slight disfigurement; but he is a horse of substance and quality, and will make a hunter. No. 352, the third-prize horse, has not quite the same quality as his two more successful rivals, but is a finely formed horse, and will some day make a very fine weight-carrying hunter.

We were pleased to notice the increased amount of interest which appeared to be taken in the classes for young horses; and this must be an encouragement to those who are taking an active part in promoting the breeding of hunters.

JOHN B. BOOTH.

J. H. EDWARD HEATHCOTE.

HACKNEYS, ROADSTERS, &C.

Hackney Stallions had some fair representatives, although only 5 competed. Mr. Walter Gilbey's "County Member" was deservedly first. This fine four-year-old, bred in Yorkshire, of hackney pedigree, is a rich brown, of stylish form, and a grand goer. A very fine mover exhibited by Mr. Rose, of Huntingdonshire, "Lord Bang," of "Old Perfection" blood, followed very closely; and the Yorkshire "Danegelt" of Mr. Bourdass goes well, but is somewhat deficient in quality, a property difficult to preserve in this description of horse.

Pony Stallions, as a class, were not equal to what has been seen on former occasions, although Mr. Backhouse's "Sir John," here placed third, was first at Shrewsbury. He was certainly beaten by his stable companion, "Sir William," a beautiful brown pony of fine action, and also by the brown Scotch "Mars" of Mr. Martin.

Hackney Mares and Foals were a good class, the handsome and strong "Princess" of Mr. H. Moore scoring a good first. She is by "Denmark," sire of so many good hackneys. A Norfolk mare of beautiful quality, "Lady Jane," of "Prick-willow" blood, belonging to Mr. Hamond, and the Yorkshire-bred "Dagmar," sire "Denmark," shown by Mr. Wells, were the prize-takers in this, a class of specially good and useful animals. Only four Pony Mares and Foals were entered, and Lord Cawdor and Mr. Burrow were credited with the prizes. In Classes 35 to 40 inclusive, the prizes were given by the Preston Local Committee, supplemented in Classes 39 and 40 by 25*l.* in each case, given by the Borough of Blackpool. Owing to the conditions under which these prizes were offered, some difficulty was experienced by the Judges (*vide* Report, p. 643).

Class 35 for Harness Horses, 3 years old and upwards, brought out several well-known competitors, although their respective owners were debarred the pleasure of driving round the great ring, "the observed of all observers." The competition was soon shortened to three of the most prominent, the skewbald mare, "Movement," so well known as a splendid goer, Col. Le Gendre Starkie's handsome "Sunbeam," and Mr. Hothersall's "Prince," by "Denmark." They were eventually placed in the order named, as, although "Sunbeam" found many partisans, yet the finished style of "Movement" could not be gainsaid, and she was, as usual, placed first. Two-year-old Colts and Fillies only produced four entries. A middling mare by "Gladstone" and a colt by "Mulatto," by no means equal to his sire in appearance, won places. In Class 37—Weight-carrying Hackneys, not over 15 hands 2 inches high,—the prizes

offered brought out a class of grand goers. Mr. Wilson's beautiful "Lady Watton," by "Denmark," was easily first. She appeared in blooming condition, and exhibited perfect action of much easier character than is usually the case with trotters, her freedom of movement being equally noticeable in all her paces. Mr. John Robinson was placed second with his chestnut "Princess," 5 years old; her training is perfect, and her action very fine, but not of the easy and natural description of that of her successful rival. "Vandal," a fine goer of "Denmark" blood, and the Norfolk-bred "Kitty," from the second-prize hackney mare, formed most attractive features in the display in the horse ring.

Hackneys under 15·2, and equal to not less than 12 stone, were headed by the fine bay gelding "Cardiff," which was placed second to Mr. John Robinson's "Lady Shrewsbury" last year. That mare had at Preston to take third place, her stable companion, "Lady Julia," being put in front of her. The horses of this well-known exhibitor were noticeable for the perfection of their education.

Class 39, for Hackneys or Roadsters between 13·2 and 14·2. Here the familiar figure of Mr. Pope's "Maggie" was to be seen in her accustomed position, beating Mr. Frisby's handsome brown mare "Sovereign," by "Denmark," and the veteran "Maritana," her more habitual opponent—here placed third, in a class of good goers. The Pony Class was by no means good, a lively Liverpool five-year-old, "Relish," getting first, the rest being of but little merit. The Report of the Judges deals fully with Hackneys and Roadsters, Harness and Saddle-horses, different ages and heights, and prizes offered and conditions arranged by Local Committees; but it will always be remembered in the words of the somewhat rude North country saying, that "those who pay the piper have the right to choose the tune."

Report of the Judges of Hackneys, Harness Horses, and Ponies.

Before reporting on the various classes which we have judged, we beg to draw attention to the confusing application of the words "Hackney" and "Roadster." Whether rightly so or not, judges, as a rule, interpret the word "Roadster" as applying to a horse suited to driving as well as to riding purposes, and the word "Hackney" as referring to riding-horses only; but from the way the prize list was worded we could not believe that it was intended that we should adhere to these views.

In the first four classes that we judged there was no mention of the term "Roadster," but it was inserted in the conditions of Class 37, which was the first class shown to us under the saddle; the same remark applies to the next three classes, yet they must have been intended for riding-horses only, as the harness horses had separate classes for themselves.

We would suggest that all classes shown under the saddle should be termed "Hackneys for riding purposes;" that classes for driving-horses should come under the head of "Harness horses," or "Hackneys for driving purposes;" and we further urge that, as the Stud Book for this class of animal has agreed upon and adopted the distinct term "Hackney," that of "Roadster" be discontinued.

We beg very strongly to recommend the above course as one which will greatly simplify the work of Judges for the future; it will also enable them to give more satisfaction to the public, and exhibitors will clearly understand the conditions under which their animals are being judged. We also recommend that the Hackneys for driving purposes should in future be shown in harness, with the exception of those classes for three-year-olds and under, as we do not consider that Judges can in all cases distribute the awards correctly until they have seen the horses driven. Manners of aged horses should be taken into consideration for harness as well as for the saddle; besides, some horses go in such different form when they are driven to what they do when led in hand.

We found Class 35 an exceptionally difficult class to judge, as three-year-olds were competing with aged horses, which was very unfair on the former; neither was there any restriction as to height, consequently horses of entirely different classes were judged together. On enquiry, we were informed by the Steward of our ring that the prizes were given and arranged almost entirely by the Local Committee. We hope the Council will permit us to recommend that they should keep these arrangements entirely in their own hands, so as to establish right precedents for other Shows to follow.

Taking the classes as they come on the list—

CLASS 11 was small, only five entries, but the first- and second-prize winners were good horses.

CLASS 12 had eight entries. The first, second, and third were good animals, the others were bad.

CLASS 17.—This was an exceedingly good class, as was shown by the whole class being commended. The first- and second-prize animals were exceptionally good, and we asked if a third prize might be added, as the mare which we placed third and the mare to which we gave the Reserve Number were both good mares worthy of notice. There were eleven entries.

CLASS 18.—Only four entries, of which the prize-winners were useful ones.

CLASS 35.—Nine entries. A very mixed class, the winner of which is a very perfect mover and beautiful harness mare.

CLASS 36.—Four entries. A very bad class.

CLASS 37.—Eight entries. A very good class, the three prize-winners being all very good animals.

CLASS 38.—Seven entries. A very good class, the first-prize winner an exceptionally fine mover.

CLASS 39.—Eleven entries. A very good class, the first- and second-prize winners being exceptionally good.

CLASS 40.—Six entries. A very bad class.

W. H. FIFE.
WM. PARKER.
JOHN ROWELL.

In signing the Report I am compelled to state I consider the prize-winner in Class 11 (Hackney Stallions) deficient in *quality*, and also in character, for high-class "Hackney Sires."

In Class 36 (Harness Mare or Gelding foaled in 1883) the first-prize winner is to my mind a well-moulded and promising harness mare.

WM. PARKER.

CATTLE.

Entries of cattle showed a diminution of 40 head from last year, and the number, 539, was less than at Reading, though in excess of York, Derby, and Carlisle. Animals of great and unquestionable merit appeared, and the show altogether, although by no means large, evinced in many breeds a distinct advance in quality, a general improvement in outline, and a more correct appreciation of the principles which should influence cattle-breeders. Longhorns were omitted from the Catalogue, the Council being doubtless influenced in arriving at this decision by the very poor display in number and quality of that breed at Shrewsbury last year. It was also a matter of regret to many that the useful and beautiful Guernsey variety, which formed so pleasing a feature in the Shows of 1881 and 1882, should have no classes.

SHORTHORNS.

These "Universal Intruders," to quote Mr. Thornton, appeared in considerable numbers; and this is not surprising, when it is considered that Holker, Lathom, Townley, and other stately homes of the breed, are within the county limits: 130 entries were catalogued against 107 last year, and 132 at York. It cannot be stated that the general quality of the exhibits showed marked improvement on previous years; in so large a number of the picked Shorthorns of the kingdom there were, of course, many animals of conspicuous excellence, but the general impression was one of uniform mediocrity, with here and there an exceptionally good specimen. In the Classes for Bulls, the age was again curtailed, none being now admissible over 5 years old. Since 1881 the Council have been gradually reducing the age. In that year it was unlimited; in 1882, six years formed the barrier; and now five years has been adopted. This is manifestly an improvement on the old system, which enabled bulls, when past profitable use, to go from show to show, and, by dint of mere rotundity, carry off prizes from more serviceable animals. In the Class for Bulls calved in 1880 or 1881, eight appeared, and, after much deliberation, the prize went to a large-sized and handsome white from Cornwall, "Earl of Oxford," of mixed Oxford blood, which was placed before Mr. Rowley's well-known "Self Esteem 2nd," Royal Champion for 1883, and first in his class in 1884. The victor on this occasion is of splendid carriage, especially when meeting the spectator. His form is by no means faultless, his sides being

flat, and his top unlevel. He is more lengthy than his rival, and superior to him in hip as well as brisket. He carries a fine head, better than "Self Esteem 2nd," which, despite his name and fame, has always lacked masculine character. He, however, made a good fight for the place of pride; and in the opinion of many, who prefer compactness and neatness of outline, the judgment might have been in his favour. Mr. Baker's roan, "Paulowitz," third prize, an "Oxford Butterfly," has much character and good flesh, but is somewhat slack on the chine. Mr. Wakefield was put reserve and highly commended for his useful "Baron Sedgwick," of Holker Barrington blood, which was third in his class at the Royal in 1881, second in 1882 and 1883, appeared in the third-prize family in 1884; and he is now, as stated, reserve number in his class—a career of success most unusual in animals trained for show, and which testifies to the fact that, if proper care be observed, cattle of sound constitutions may be exhibited year after year without injury. "Grand Ruth," the fine white bull belonging to the Duke of Portland, was far ahead of the rest in the class, and some critics were of opinion that he merited a higher position.

In the Class for Three-year-old Bulls competition was limited to four. The first, a roan of medium quality, Mr. Thompson's "Royal Baron," from Cumberland, was placed before the Cheshire bull, "Sir Stafford," a useful red, in an essentially weak class.

A much stronger array appeared in the Class for Two-year-olds, although 5 were absent out of 17 entries. In the first prize is found the Champion Male Shorthorn for the year, and it must be conceded that seldom has that honour been more worthily won. Mr. Handley, of Greenhead, Westmoreland, gained this coveted distinction with his "Royal Ingram," by the well-remembered "Sir Arthur Ingram," and with a female ancestry of winning ways. This bull, now 2 years and 7 months old, is almost faultless in outline and character, a slight deficiency in front flank being the only place to point out as a suspicion of a fault; he has a fine head and horns, and a placid expression which speaks well for his disposition; he is perfect in touch and hair; and if his colour were less objectionable, he would be invaluable. Should he, however, perpetuate the pale red and white of his coat, it will go far to neutralise the perfection of form he undoubtedly possesses. He was first as a yearling last year at Shrewsbury, and this season has been shown seventeen times, taking first prize on each occasion but one, when Mr. Brierley's "Ruckley," third-prize bull here, was placed before him at the Oxfordshire Show. Mr. Rudsdale's "Lord Salisbury" was placed second; this good-looking roan from Yorkshire, of good pedigree

and high character, would have been considered a good one in the absence of the Champion. "Ruckley," third prize, which, as has been stated, beat "Royal Ingram" at Chipping Norton, is a very neat animal, bred in Shropshire; but certainly at Preston he appeared at a disadvantage when compared with his conquerors. Mr. Cooke's reserve and highly commended "Sea Captain" is also red and white, and looks a good stock bull; and Mr. Savile Foljambe got a commended card for his "Bright Prince," descended from that grand bull "Breastplate;" but "Bright Andrew," another heavy "Bright" bull on the female side throughout, bred by Mr. Pugh, was unnoticed by the Judges. This, as far as quality is concerned, was much the strongest class of bulls shown. A large class of 24 entries, 5 absent, next faced the Judges; but it cannot be said that anything of remarkable promise was present. H.R.H. the Prince of Wales showed three, and secured a commended card for his "Maidstone,"* a neat roan, bred at Sandringham, by "Trojan," from "Prinknash," first Royal Yearling at Reading. This youngster was much admired, which cannot be truly averred of the prize-takers. The Duke of Northumberland's "Hopewell," a light roan "Irwin" bull, with a weak head and objectionably coloured face; he is somewhat plain in thigh and rump, and not first-rate on the hip; he has, however, a fair quantity of good flesh, and is specially good in hand. Mr. Handley's second prize, "Golden Treasure," by "Sir Arthur Ingram," is of better quality, and many preferred him to the winner. The Duke of Devonshire was placed third, with a neat blue roan from Holker, "Baron Oxford 18th," whose pedigree is indicated by his name. His head has stronger character than that of either of the winners, with a somewhat coarse horn, which he will probably grow up to. The Judges reserved and highly commended Messrs. Beach and Coupland for "Confidence," a very neat roan, which will probably be heard of again. This yearling is by "Self Esteem 2nd," and scored his first win as a Royal sire. They also commended "Maidstone" and three others.

In the Class for Cows in-Milk or in-Calf, 11 entries only produced 6 in the ring, and of these, the two cows of the Duke of Northumberland were selected as first and second. These cows, which are not in the overfed condition so frequently seen in the Showyard, were apparently chosen for the purpose of

* Since this was written, I have received a note from Mr. Beck, the courteous manager of the herd of H.R.H. the Prince of Wales at Sandringham, in which he states: "There is an error in the 'Royal' prize list, for 'Wolferton Knight' by 'Trojan' was commended at Preston. 'Maidstone,' though entered, we were unable to send, as he went to three shows in Ireland, viz. Belfast, Londonderry, and Cork, at each of which he won second prize.—J. T."

protesting against the system of unduly forcing breeding animals for exhibition ; the first-prize cow, entered by the exhibitor as "Rosebud 12th," which is evidently an error, as her dam is stated to be the same number, has a splendid pedigree. "Fitz-Roland," her sire, was sold at the Aylesby sale for 370 guineas, and was a son of "Highland Flower," for which the Rev. Mr. Staniforth gave 1500 guineas. She is of good size and frame, but wants evenness of form, all below being decidedly light ; her hips are wide, and her points generally may be characterised as "gaudy ;" she has a good though slightly coarse head, which she carries well, and her horns are somewhat strongly developed. The younger cow, "Mountain Daisy," placed second, is of smaller scale and more feminine character, and in the opinion of many is preferable to the first-prize cow. Both these animals are in healthy firm condition, but give the idea of being what is graphically termed "light fleshed," and are certainly not equal to some which have previously occupied their position in this important class. Mr. Sharpe's "May Duchess 15th" is about five-sixths of a good cow, but the remainder quite destroyed her chance of higher distinction. She is very fat, and has broken out on the rump so much, that the Judges could only discard her, although they somewhat strangely placed her before Mr. Brierley's fine white cow of Bolivar blood, "Snowflake," which headed the list of winners in 1883 and 1884, and was reserved in 1882. She appeared at some disadvantage, having calved a month previous to the Preston Show, and looked slightly jaded ; her beautiful coat and touch, combined with her evident deep milking qualities, retained for her many admirers ; and the opinion was very generally expressed that her place on the prize list might well have been higher than reserve ; in a class by no means equal to what has been seen on former occasions.

The next class furnished the Champion Shorthorn female, Mr. B. St. John Ackers gaining this honour with a very neat Prinknash heifer, "Lady Carew 13th," with all the attributes of her "Booth" descent. She scored an easy win as Champion, and is noticeable as being very compact, fine in hand and hair, and of high quality. She was manifestly superior to any of her competitors, but is not really of commanding excellence when compared with previous exhibits.

Mr. Thompson's "Inglewood Belle," another "Beau Benedict," with a dash of "Butterfly" blood, is a larger heifer, with somewhat weaker points, than the Champion, and is altogether of less quality. Mr. Brierley's "Rosedale Duchess," bred in Northants, is a neat roan, and will doubtless be heard of again ; and the handsome "Broadmoor Foggathorpe" obtained the reserve and highly commended.

In the Class for Heifers calved in 1883, a very interesting contest took place; some Heifers which had previously met in the Show-ring again appearing, the result of the judgment was anxiously waited for. The class was large, and of good quality—19 entries, with 17 appearances. After much deliberation, Mrs. McIntosh was credited with first place for her handsome roan, "Havering Nonpareil 2nd," full of "Tele-machus" blood, and with evident marks of her ancestry. This fine heifer, of large scale, rich colour, and full of firm flesh, was first at Shrewsbury as a yearling. She has now lost somewhat of the regularity of form she then possessed, and is disfigured by an overgrown rump and a little coarseness of lower jaw. Second to her was Mr. Brierley's "Rosedale Snowflake," from his celebrated cow by "Rosedale Oxford." This breeding ought to tell in future. She is a heifer of fine quality, and took the same position with regard to the winner at the Bath and West of England Show at Brighton, and was placed third at the Essex Show, where Mr. Savile Foljambe's "Queen Esther," of Townley-Booth extraction, which at Preston only reached the reserve and highly commended place, was placed first. Mr. Garne's "Lady Ebury," third prize, is a very taking animal, showing much quality; and the Judges highly commended two, and commended three others of this undeniably strong class. The awards here were the subject of much criticism; but the balance of opinion was to the effect that the decision of the Judges at Preston was correct; and had the Havering heifer retained her form of last season, she would have had no mean chance for the championship of her sex; and certainly, if the production of fine butcher's meat in good quantity be a desideratum in cattle-breeding, it must be admitted that she was far in advance of her competitors in this respect.

The Class for Yearling Heifers had 21 entries, and the winner turned up in Mr. Hoskins's "Alexandra 9th," a Siddington-Bates heifer of considerable promise, which beat, especially in touch, the Duke of Portland's good-looking "Queen of the Cressidas 3rd," and Mr. Teasdale Hutchinson's young but very neat "Victoria Formosa." Mr. Leney's handsome "Belle Blanche," a red heifer of "Cherry" blood, took the reserve and highly commended card in a strong class of youngsters. Three commended cards were distributed to others, of which the Queen received one for "Cowslip."

Nine groups were entered, and all appeared,—the Cow and her Offspring forming the family circle on this occasion, in contradistinction to the order used last year, when the sire was considered the head of the family. The first prize went to Northants, for Mr. Sharp's "Julia 14th," of Babraham "Lord

Chancellor" blood—a cow of great style and quality, and evidently an excellent breeder, as her three offspring attest. Mr. Hutchinson got second with his "Lady Grey," and her two handsome Booth-bred roans, "Lady Golightly" and "Lord Gordon." The family groups were not so interesting as at Shrewsbury, where the impress of the different sires was so markedly noticeable.

NOTE.—It may be interesting to breeders of Shorthorns to know what sort of animal was considered a very good one of that breed nearly 100 years ago by so eminent an authority as Arthur Young. In the "Agricultural Survey of Lincolnshire," 1794, he writes:—"Sir Joseph Banks had the goodness to show me at Boothby, in the Middle Marsh, in company with the Rev. Mr. Walls of Spilsby, and that place, two beautiful short-horned heifers, 'Spot' and 'Gypsey,' bred by His Majesty, and now extremely fat; they are only four years old, the smaller of the two of the more correct form, but both are beautiful animals." For purposes of comparison I measured the first-prize cow and the Champion female at Preston, and append the respective dimensions. It will be seen that the difference consists in the somewhat thicker and more compact structure of the modern Shorthorn; but it must be admitted that the change of form is not so great as might have been imagined.

	"Spot."	"Gypsey."	"Rosebud 13th."	"Lady Carew 13th."
	ft. in.	ft. in.	ft. in.	ft. in.
Across from the centre of one hip to the centre of the other	2 1	2 2	2 3½	2 1½
Length in quarters from centre of hip	1 10	1 11	2 0	1 8
Breadth of nache 8 inches below the tail setting on	1 6	1 3	1 8	1 8
Girt chine	8 0	7 8½	7 4	7 1½
Girt centre	9 2	9 0	..	..
Length from withers to rump point..	5 4	4 7½	4 9	4 2
Height at rump	5 0	..	..	..
Girt neck	8 7	..	..	..
Horn to withers	2 8	..	..	..
	4 years	4 years	7½ years	8 years.

J. T.

Report of the Judges of Shorthorns.

The show of Shorthorns was, as a whole, disappointing. There were few animals of great merit; but in some classes the competition was good, and CLASS 44 contained several promising animals.

Bulls were by no means good, and CLASS 42 was so indifferent, that we should not have awarded a third prize even if the rule of the Society had permitted it.

Females were better than males, and our decision in the *Cow Class* (45) appears to have excited some criticism. The first and second animals in this class were shown in nice breeding condition, and we think it will be a matter of some satisfaction, not only to the Society, but to breeders generally, that we were able to award these two prizes to animals in that state.

The Family prizes were strongly contested, and presented the usual difficulties in making the awards.

The competition in CLASSES 48 and 49 was good, and the animals were more uniform than in the preceding classes.

HENRY W. B. BERWICK.
J. W. CRUICKSHANK.
C. STEPHENSON.

HEREFORDS.

The show of these fashionable meat-producers was considerably smaller than at Shrewsbury, where they were in excess of any others, numbering 144 entries against 76 this year. In the Old Bull Class, one being absent, the competition was reduced to a match between Mr. Price's "Hotspur" and Lord Coventry's "Good Boy," when the former won by a head, that being the only part decidedly superior to his rival. Both these bulls are well-known, and have previously competed with varied success. The contest was exceedingly close; but the winner, of the renowned "Horace" blood, seemed to possess the truest Hereford character, and his rich colour showed advantageously against the somewhat lighter red of "Good Boy," which latter took first prize in his class at Shrewsbury, and is very fully described in the Report on Live Stock for last year. He was Champion at the Worcestershire Show this season, but was not eligible to compete at Brighton, having had the first Bath and West of England prize last year. In the Class for Three-year-old Bulls, only one appeared, and he had previously beaten the winner in the preceding Class. This massive animal is by "Lord Wilton," and shows in his fine head and crest unmistakeable marks of his illustrious parentage, although he has had to succumb to "Good Boy" in other competitions.

In the Class for Two-year-old Bulls the prize went to one of grand quality and extraordinary weight, "Maidstone," belonging to Mr. H. W. Taylor; he is of "Lord Wilton" blood and a grandson of "Tredegar." This fine animal won at Shrewsbury last year, and has since proved invincible both in England and Ireland. Second to him was a smaller bull, "Royal Grove," son of "Grove 3rd." Mr. Tudge's well-bred and handsome bull, "Leinthall," somewhat surprisingly, was relegated to his last year's position of third in a class of 5, all of which appeared, and were noticed by the Judges.

In a Class of 19, 14 showing, Mr. Rankin, M.P., got first with a yearling of fine character, good in front but deficient in hind-quarters and depth. He is by "Bangham," a son of "Lord Wilton," which makes his first appearance in a Royal prize-winner on this occasion. Second to him was a very promising youngster, not previously shown, and well-termed "Upper Crust," by "Cornlift;" and Mr. Taylor's handsome son of "Franklin,"

"Lucifer," also unshown before, took third (in a decidedly strong class of Young Bulls, which show good cause for the eminence the breed has attained). The Judges highly commended the reserve number "Brilliant," and gave commendations to "Lancet" and "Harford."

In the Cow Class only 4 put in an appearance, and, as might be expected, "Golden Treasure," from Croome Court, marched off with the first prize. This well-known cow appeared in fine condition, and seemed conscious of her claims to pre-eminence. Her appearance and breeding have been so fully and frequently descanted on, that further description seems unnecessary. The second prize went to a beautiful Showle Court cow, which was last year placed before her great rival at the Bath and West of England. "Rosamond" was the first-prize Family-Class cow at Shrewsbury, and retains, at a somewhat advanced age, many of the good points which distinguished her youth. "Mabelle," Mr. Gough's, by "Lord Wilton," a comparatively young cow, was third; she is of good style, true type, and must be considered a very good specimen of her great sire. Mr. Rankin was placed reserve with "Flo," overpowered.

Heifers in-Milk, &c. In this Class there were but 5 entries, all of which received the Judges' fiat of excellence. Mr. Allen E. Hughes's "Sunflower," placed first, unites in a remarkable manner the attributes of a high-class animal. Of great scale, dimensions, and weight, almost perfect symmetry, fine and very thick coat of beautiful colour, with splendid quality of flesh, she has entirely fulfilled the promise of last year, when she was first in her class; but whether she is now a breeder remains to be shown, for as usual the prize is held in abeyance. Second to her is Mr. Rankin's "Grace Wilton," sired by "Lord Wilton," a much smaller heifer of sectional proportions, entirely different type, and lacking many points distinguishing the first and third heifers in this Class. "Rosa," third here, was the "plum" of the beautiful group of four which took first prize at Shrewsbury, all of which were by the same sire, "Lord Wilton." She is of much the same style as "Sunflower," and although shown with a pretty calf by "Sylvester," appeared in good condition, and many who admire uniformity of type combined with high character were of opinion that her place should have been higher on the list.

Only four Hereford Families appeared, Mr. Tudge taking both prizes with "Rebe" and "Roseleaf," first and second respectively. Three of the four youngsters are by "Auctioneer," a son of "Horace," a bull evidently doing good service in the Leint-hall herd. These groups were much admired, and formed a very attractive feature in the cattle parade.

In the Class for Two-year-old Heifers, 8 were shown, 2 being

absent. Mr. Taylor's "Vanity 7th," by "Lord Wilton's" hard-working son "Franklin," was deservedly first. This heifer, of which an enthusiastic reporter writes that she "is of sweet face and most captivating *tout ensemble*," is one of the most perfect specimens of a Hereford ever shown; she had an unbroken line of victory previous to Preston, and since then has at home been adjudged the best Hereford female, viz., at the Shropshire and West Midland Society's Show. It is unnecessary to recapitulate her good points, as she appears to have no bad ones. Mr. Turner's "Kathleen," and Lord Coventry's "Plum Jam," second and third respectively, are good specimens, but lack the completeness of the winner. The Judges reported very highly of this Class, and noticed favourably 6 out of the 7 shown.

In the Juvenile Class, 15 appeared out of 20 entries; and after long consideration, the Judges decided in favour of Mr. Hughes's "Ladybird," by "Garfield," a son of "Horace," and also of "Grove" blood in the female line; giving a very neat daughter of "Good Boy" second; the Showle Court heifer "Wintercott 3rd," by "Franklin," obtained the third place; and the Class merit may be estimated by the fact that the Judges highly commended 3 and commended 6 others of this very interesting entry.

It must be admitted that the Herefords, although not in such force as at Shrewsbury, made a most creditable appearance, and fully maintained the prestige of this favourite breed, the value of which is so well-known both at home and abroad. The benefit of using sires of the purest blood is conclusively proved by an examination of the pedigrees of the prize animals, which will be found to testify to the excellence of such sires as "Horace" and "Lord Wilton."

Judges' Report on Herefords.

CLASS 50 contained two animals of great scale and merit; but we differed in opinion—two of us being in favour of No. 540, and one in favour of No. 539.

CLASS 51.—One animal, but that a good one.

In CLASS 52 there were six entries, of which five came to hand; "Maidstone" easily taking first place.

CLASS 53.—This was a very strong class, and a very even and level lot, and running so close as to cause us some time and trouble.

CLASS 54.—Five entries, with four wonderful great cows.

CLASS 55.—Five good animals; but we felt doubtful as to the first-prize animal's breeding.

CLASS 56.—This class contained some very promising animals.

CLASS 57.—This contained seven beautiful animals, one or two of them the very best in the female classes.

CLASS 58.—This was one of the largest and best of the Hereford classes, and took us a lot of time to decide; many of them running so even and true, one with another, as to cause us considerable difficulty.

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On the whole, we considered the Herefords to be quite equal to former occasions, and promise well for success in the future.

JOHN CRANE.
REES KEENE.
JOHN M. GRIFFITHS.

DEVONS.

These bovine aristocrats, which, however, rarely merit the term "bloated," were short in number, but of quite average quality; only 25 were entered against 48 at Shrewsbury, and 33 at York. This may be attributed to the fact of the ages of the bulls being restricted to five, and that of cows to three years. Those shown may, however, be regarded as the best representatives of the breed, and comprised such fine animals as Mr. Perry's "Benedict," first here and at Shrewsbury. His relative "Bravo," belonging to the same owner, took second; he was first as a two-year-old at York. "Lord Cutsey 2nd," highly commended here, was second at Shrewsbury, and Sir Wm. Williams's "Duke of Flitton 17th," which got the reserve, made an array of excellence not easily excelled.

The first-prize bull in the next class, "General Gordon," has been out six times, and on each occasion has obtained the premier position.

Devon Cows only numbered three, and did not show equal merit with the Bull Classes. "Frolicsome" repeated her Shrewsbury victory, Mr. Howse's "Lily" taking second. In Two-year-old Heifers, a class of 5 very neat ones, Sir Wm. Williams's "Flame," worthily placed in her Shrewsbury position, headed the list. She has much quality and a liberal allowance of good flesh. The second-prize, "Norah," is deficient of regularity of outline, especially behind. The winning heifer in the next class, Mr. Walter's "Dairymaid 4th," was in the same position at Brighton and Taunton. She is evenly fed, and although small, has probably a successful career in the prize-ring open to her, as in this breed quality is always preferred to bulk. The Judges note with dissatisfaction the arrangements of the prize-list; and it does seem somewhat strange that a breed more remarkable for mature excellence than for early maturity should be the first in the Catalogue in which the age of cows eligible for competition is curtailed.

Report of the Judges of Devon Cattle.

In compliance with a request from the Council for the Judges in the several departments to make any special comment they may deem expedient upon the relative merits of the animals brought before them, we, the undersigned, in commencing with the Devons, beg to observe that, although the entries were not so numerous as might have been wished, we nevertheless consider

that the several classes had specimens in them to very fairly represent the character of this ancient and popular breed of cattle. Whilst being of opinion that the correct type and character of the thoroughbred Devons were more noticeable in the male animals of Sir W. Williams, Bart., and Mr. Perry, as well as in the female exhibits of the former, we still regard with great favour the animals shown by Messrs. Skinner and Howse. Indeed, we consider the young bull, "General Gordon," shown by the former gentleman, an animal of great promise, and likely to be heard of again as a prize-winner. Neither can we pass over the "fashionable," though rather diminutive heifer of Mr. Walter, whilst Her Majesty's in the same, and Mr. Surridge's in the Older Class, are animals possessing much excellence.

In reverting to the number of entries being below par, we think this may be accounted for in some measure from the long distance from home; besides being impressed with the idea of placing the four ages of male animals in competition, and altogether excluding the female over three years and seven months, necessarily lessened competition, and, not unreasonably we think, caused dissatisfaction among the breeders, in depriving them of the opportunity to exhibit an animal which is obviously the brightest and most fascinating production of their herd—namely, the fully-matured cow, which has been spoken of in the Society's 'Journal' on former occasions as claiming as great attention on the parade as any pure-bred mother in the Yard.

With these impressions, we venture to suggest to the Council's consideration whether a return to former arrangements may not be conducive to the Society's interest, and be more satisfactory to the exhibitors.

S. P. NEWBURY.
CHARLES ELLIS.
ROBERT C. COOKE.

SUSSEX.

In the Classes for Sussex only 22 entries were made, and of these 8 were absent; but the show of these dark beauties is not without interest to those who remember animals of this breed at the Smithfield Shows of twenty-five years ago; and it may be safely asserted that, by whatever means accomplished, there is no breed of cattle more improved in quality and aptitude to fatten than these denizens of the Downs. Instead of the large limbs, coarse and irregular frame, and the hard unyielding skin which distinguished the first exhibits, there may now be seen Sussex heifers of meek appearance, and bulls which show but few signs of coarseness, although evidently retaining great strength of constitution and hardihood. This breed is deservedly popular as producing a large quantity of beef of high quality at a fairly early age; and the remarks of the Judges as to the Devons may be repeated as applying with equal force to the disadvantage to the exhibitors caused by the curtailment of age. A very handsome bull from Surrey, "Prince Rufus," was placed before Mr. Stewart Forster's coarser Kentish specimen, "Slander 3rd." In the Younger Bulls the prize went to a lengthy but plain yearling of Mr. Forster's, placed before a much neater one of the same gentleman. Only one cow

appeared, a nice heavy-fleshed animal, firm in touch and good-looking; she was at Shrewsbury, but only reached the reserve and highly commended in that contest. The first-prize and second-prize heifers, Mr. Goodman's "Noble Lady 1st" and Mr. Forster's very neat heifer from Kent, were noticeable as being meaty and of good quality. In the Yearling Heifers the competition was reduced to three by absentees, and a somewhat coarse heifer of Mr. Hodgson's secured the first place.

Report of the Judges of Sussex Cattle.

The Classes here were fairly representative, except the Cow Class, in which there was only one shown (and that a very good one), owing to the regulations as to age—that no Cow born in 1881, or previously, was eligible. This restriction was much commented upon by the breeders, and caused great dissatisfaction. The exhibits of one of the best Sussex breeders (Messrs. Stanford) were absent, owing to a railway accident to some of their stock intended for exhibition, as well as to the restrictions in the Cow Class. The distance from home would account for the classes not being so well filled as at Brighton.

We consider this class of stock very hardy, massive, and well-adapted to their climate; and we notice a very marked improvement in their quality of flesh and aptitude to fatten. They are much appreciated for their beef-bearing properties, particularly for attaining a great weight at an early age. We regard the specimens shown as very creditable to the breeders.

SAMUEL P. NEWBURY.
CHARLES ELLIS.
ROBERT C. COOKE.

WELSH.

These hardy mountaineers appeared in 28 entries, and except at Shrewsbury, where 60 were catalogued, formed a more important section of the Show than usual, as at York only 8 were shown. They, like the Sussex, have improved mightily of late years, standing on shorter legs, and showing much more meat in proportion to bone than formerly. The Judges present a Report so much in detail, that but little remains to note. Five yearlings met in the Bull Class, and a shapely North Wales youngster of Colonel Platt's beat Lord Harlech's from Merionethshire. In the Heifer Classes much diversity of character was observable, and the remarks of the Judges as to the necessity for regulating the entries by a Herd-book qualification must commend themselves to all who noticed carefully this class at Preston. The Judges gave the first prize to a firm-fleshed Castle Martin heifer, Earl Cawdor's "Curlew 4th," and the second to a North Wales specimen of Colonel Platt's. Mr. Pugh sent one of his "smoky-faces" from Shropshire, but it did not receive favourable notice, although a useful animal. The Heifers in the next class were not remarkable, except for similarity. In the Yearlings, Mr. Oaklev

showed one of good quality, and 7 out of the 9 entries were highly commended or commended. It is satisfactory to note that but two of the Welsh entries were absent.

Judges' Report on Welsh Cattle.

On the whole, the general quality of the Welsh cattle is very much improved. We found one Aged Bull an extraordinary good specimen of the breed; another animal in the same Class (69) deserves notice, owing to a slight error in his age, as specified in our book of instructions, which represented him to be two years older than what he really is, as seen in the Catalogue; consequently we did not give him the notice he really deserved. He was given the reserve number; but we should strongly recommend him a third prize.

CLASS 70.—This class, for *Young Bulls*, was not so well represented as on some former occasions, and the class as a whole was not very creditable to the Royal Agricultural Society. One animal, in particular, showing too much white.

CLASSES 71 and 72.—These classes were very good; their merits being so nearly equal, and there being a little difference of opinion, they gave us some trouble.

CLASS 73.—This class showed a marked improvement; the animals, most of equal merit, gave us considerable trouble, and it was quite a matter of taste as to which animals we should award the prizes.

One of our number, who is a breeder of Welsh cattle, strongly recommends that the exhibits should be confined to Black Cattle entered in the North or South Wales 'Herd-Book,' as we had brought before us some brown, and others with more white than is desirable.

J. M. GRIFFITHS.
JOHN CRANE.
REES KEENE.

RED POLLED.

These stand next in the Catalogue with a fine collection of 32 entries, which, considering the habitat of this popular breed, speaks well for the energy and enterprise of the men of the East Coast. Seven bulls more than one-year-old met in Class 74, and the grand bull "Passion" again took the first place. When two years old, he obtained third prize in a Class of All Aged Bulls at York. He shows immense substance, and much quality. Mr. Colman's "Don Carlos" is not far behind, allowing for the year in advance possessed by "Passion." Only 3 Two-year-olds appeared, and Lord Hastings won easily with "The Duke," although he is a little flat; the same fault exists in the second prize, "Orlando," belonging to the Duke of Hamilton and Brandon. In the Cow Class the same three cows which took the prizes at Shrewsbury, met again with a varied result. "Rosalie" was still first; but the straight though somewhat coarse "Kate" of the Duke was preferred to the neater "Didlington Davyson 2nd." "Ruperta," the winner in her class at York, was here placed second, being beaten by "Poppinette 2nd" at Shrewsbury; thus

in two instances time has had its revenges. "Jovial," "Bugle," and "Easton Rose," the only remaining heifers in the class, were commended. In the Yearling Class were 9 entries, 2 absent; and all 7 received a favourable notice, the beautiful little heifer of Mr. Colman, "Midsummer Rose," getting first after a struggle. This is half-sister to "Rosalie," being by "Othello," out of the same dam; Lord Hastings showing a heifer of much promise, "Melton Rose 5th." This class was remarkable for its general excellence, and must be considered essentially a strong one.

Report of the Judges of Red Polled Cattle.

Taking into consideration the long distance Preston is from the native counties (Norfolk and Suffolk) of this favourite breed, we consider the entries good, and of great merit.

In the *Aged Bull* Class, Mr. A. Taylor's No. 694 was again placed first, being both massive and masculine in form; Mr. J. J. Colman's, No. 699, second; very straight made, and of excellent quality. The class being so good, we recommended a third prize to be given to Lord Hastings's No. 697. In the *Younger Classes of Bulls* there were several of great promise.

In the *Cow* Class we were much disappointed at the restrictions which we have alluded to in the Devon and Sussex Classes; in the *Heifer* Class there were many animals of great merit.

SAMUEL P. NEWBURY.
CHARLES ELLIS.
ROBERT C. COOKE.

JERSEYS.

The entries in this department were very considerable, and so were the number of absentees. Of 127 in the Catalogue, no less than 38 failed to appear. This spoiled the appearance of these interesting animals in the sheds, but did not detract from the parades, except by diminution. Many shown were of great merit; and the Judges, evidently considering the milking qualities of the breed their most valuable attribute, awarded the prizes to animals giving the greatest indications of milk-producing power. Mr. Cornish's first-prize bull, "Earl of St. Martin's," Jersey bred, has the fine waxen colour on his points very predominant; this is also the case with the second, bred in the Island. The reserve and highly commended bull of the Duke of Portland is much larger, and does not display so much Jersey character as the winners. Two nice young bulls appeared in Class 80, from which there were 8 absentees. The prize cow "Rosa," in Class 81, seemed to fulfil all the conditions necessary to constitute a first-rate Jersey. She was shown by Mr. Desreux, and is now six years old, of somewhat small frame, and spare of flesh. She is healthy, has a beautiful skin, and her touch is perfect; the milk veins are remarkably prominent, and she carries a well-developed and perfectly formed

udder. She is evidently a very deep milker, and her previous success shows the estimation in which her power of producing milk and butter of high quality are held by experts in this favourite and fashionable breed. The weak point noticeable is in the escutcheon, which is not so fully marked as might have been expected in an animal of her celebrity, she having been Champion at the Royal Counties Show, and first at Brighton. The second, "Bessie," Mr. Simpson's, is very nice-looking, but not quite so good in touch or style as the winner. The reserve of Mr. McIntosh, "Verbena 2nd," ran "Bessy" hard for second place. Mr. Simpson was also successful in the next class with an English-bred heifer, "Pandora 5th." She is taller than many in the class, and her horns droop in a somewhat objectionable manner; but she is the gold medallist English bred cow. Next to her was placed a beautiful heifer sent by Mr. Desreux, which seems to possess more points towards those necessary for perfection. Her head and general appearance are certainly preferable to "Pandora's;" but the latter's indications of a deep milker probably stood her in good stead with the Judges. In the 1883 Heifers, Mr. Cornish had an easy win with his famed "Leonora," a beautiful silver grey, very nearly matched by the grey "Bernice" of Mr. Simpson, and closely followed by the very charming heifer, "Perry Farm Deery," belonging, as the name implies, to Mr. Desreux. This heifer has taken many prizes in her native Island. "Pomona 2nd," reserve number, is very pretty, and the whole class of 25 entries was a strong one. In the Young Heifer Class, a Lancashire bred, very taking dark grey, shown by Rev. C. Wood, was first. Her colour is very fine, and her points for milking good, but her horns are too pointed. A very beautiful heifer belonging to Mr. Cornish, "Carlo's Adrienne 2nd," was unnoticed, although to the general spectator a remarkably taking animal. The elaborate Report of the Judges treats fully on points connected with their office, and it must be said that, although the show of this breed was not equal in number to those of some former years, yet the individual merit of many exhibited at Preston has never been surpassed.

Report of the Judges of Jerseys.

The numerous entries brought for our examination show that a proper conception of the value of Jerseys is taken by exhibitors; the number of indifferent animals was small, whilst the proportion of good ones was large. What we mean by a good animal is one which bears the true type of the Island race, and combines large and rich milk-producing properties with good form.

It is evident to those who have followed the great Cattle Shows of England for some years, that a very different and much more correct appreciation of the true value of Jerseys exists at the present time than was the case formerly.

The strong tendency to show these animals loaded with flesh has all but entirely disappeared; they are no longer brought into the prize-ring to be viewed rather by the eye of the grazier than that of the dairy-farmer.

In CLASS 79—*Bulls calved in 1880, 1881, 1882, or 1883*—the first prize was awarded to No. 733. This animal gives evidence of good blood; he is fine, with an excellent forehead, a good touch, nipples well placed, and is altogether deserving of the position he won. The second prize was taken by No. 737; rich in quality, and nipples equally well placed. No. 735, a large and fine animal of no mean merit, obtained the reserve number. Four other bulls were also highly commended, and one commended.

CLASS 80. *Bulls calved in the year 1884*.—No. 746 took the first prize in this class; and, from his present appearance, he bids fair to continue a prominent animal in the prize-ring. No. 754, which obtained the second, is also a very good bull, and typical of the breed. Nos. 747 and 754 were highly commended; the reserve number being adjudged to the former. Commendations were awarded to Nos. 748, 758, and 763.

CLASS 81. *Cows in-Milk, or in-Calf, calved previously to, or in 1881*.—This was a grand class, and it was not without difficulty that the prizes were awarded. It is true that the first prize was given, without hesitation, to No. 771; but the second position was so closely contested, that it was no easy matter to decide between Nos. 765 and 766—two highly excellent animals; the prize was awarded to the former, and the reserve, with high commendation, to the latter. Three other good cows in this class were highly commended, and three were commended.

CLASS 82. *Cows or Heifers in-Milk or in-Calf, calved in the year 1882*.—No. 786, a large, promising specimen, obtained the first prize; and No. 793, a remarkably neat animal, the second. The reserve number was adjudged to No. 790. Honourable distinctions were also awarded to Nos. 787, 802, 803, 784, and 796.

CLASS 83. *Heifers calved in the year 1883*.—Here we had several excellent heifers brought together; but the disparity of age between some of these good animals rendered the judging more difficult. No. 809, the winner of the first prize, is a fine heifer, with a good thin forehead, hide of rich and good texture, and bears the appearance of a good milker. No. 804, the winner of the second prize, though not so fine or symmetrical, has all the appearance of becoming a powerful dairy cow. The reserve, No. 110, is a promising well-bred heifer. Many deserving animals in the class were also honourably placed.

CLASS 84. *Heifers calved in the year 1884*.—No. 850, which has all the appearance of becoming a good cow, took the first place; No. 842, a thin promising heifer, the second; whilst four others were highly commended, and two commended.

As we have already observed, the real value of the Jersey cattle is so generally well known and understood, that it hardly appears necessary to offer any remark on this to exhibitors; but if there be one point which commends itself to their attention more than any other, it is this—that it must always be specially borne in mind, that for the animal to be truly beautiful it must possess the merit of high quality for the dairy. It must also be borne in mind that not by the appearance and form of the udder only is the good milker to be estimated: it must not be forgotten that there is such a thing as a large and fleshy udder, which may frequently deceive and disappoint. It is the combination of the well-recognised features of the good and rich milker which must, if possible, exist.

WALTER GILBEY.
CHARLES PH. LE CORNU.

POLLED ABERDEEN OR ANGUS.

These "black but comely" cattle appeared in 28 entries, against 32 at York, there being no class for the breed at Shrewsbury. Their presence with the Galloways gave an agreeable variety to the parade, and the style and weight of those shown were in many instances such as can only be reached by the choicest specimens. "Juggler," a bull from Durham, of grand quality and Tillyfour descent, fairly vanquished "Black Knight," of greater weight, from Kincardineshire. The reserve, Lord Strathmore's "Allister," is also of fine quality; and "Premier of Montbletton," which secured second prize at York, only reached a commendation. Mr. Stephenson, of fat cattle fame, showed a young bull, "Evander," of fine carriage and very compact form; Mr. Wilken having to take second place with his home-bred "Waterside Heir." That gentleman, however, turned the tables in the Cow Class, beating Mr. Wallis, placed second, with a very handsome heifer and calf, "Waterside Matilda 3rd." Mr. Wallis's cow is very near, and Mr. Egginton's not far behind. The three Heifers shown are fairly good, but not of special merit; and out of 11 entries in the Young Heifer Class there was nothing of commanding excellence. The Glamis Castle heifer "Satanella" was placed before Mr. Stephenson's "Victorine," and a useful heifer of Mr. Egginton's. The rest do not call for special mention.

Report of the Judges of Polled Aberdeen or Angus.

The Judges have to report, that of the 28 animals entered for exhibition 26 were forwarded, forming a very creditable representation of the breed.

CLASS 85. *Bulls calved in 1880, 1881, 1882, or 1883.*—Eight entries; all forward. The animals placed first and second are exceptionally good; the others may be characterised as of fully average merit.

CLASS 86. *Bulls calved in 1884.*—Three entries, all forward; none of which call for special remark.

CLASS 87. *Cow or Heifer in-Milk or in-Calf.*—Three entries; all forward; fairly good animals.

CLASS 88. *Heifers calved in 1883.*—Three entries; all forward.

CLASS 89. *Heifers calved in 1884.*—Eleven entries, two of which were absent. As a class they were above average merit. The animals "placed" were very good. At the same time there was not a decided "top" amongst this lot.

ROBERT WALKER.

WILLIAM ROBERTSON.

GALLOWAYS.

In these Southland Scots the splendid appearance of the bulls must have been remarked by those interested in black cattle, and gave great delight to the general public, as, of wilder and more shaggy appearance than the sleek Aberdonians, these

massive Borderers stalked majestically round the parade, repaying with interest the glances with which they were favoured.

The Judges' Report on this breed is full and interesting, and may be left to speak of individual merit. It is therefore merely necessary to note that there were 26 entries, that all appeared, that the Younger Bulls compared unfavourably with their elders, and that the Cows and Heifers were of excellent quality.

Report of the Judges of Galloways.

Though the *Galloways* were few in number in several of the classes, yet the average merit was so extremely high, that in respect of quality and general excellence there has very seldom, indeed, been seen so creditable a representation of the breed anywhere. The first four animals in the *Aged Bull Class* were so very superior, that we felt constrained to give them a special measure of commendation. The first-prize bull, No. 882—a four-year-old—is a truly magnificent Galloway, whose equal it would be difficult to find. The second, No. 886, is exceedingly choice in quality, and his outlines are very level. The third, No. 885, is an animal of immense substance; while the bull which was awarded the reserve and highly commended ticket, though not in such good condition as those before him, is level, deep, and symmetrical. As one of the bulls brought into the ring showed symptoms of impure breeding, we requested the attending member to remove him—a request which was complied with.

Three good *Yearling Bulls* were brought under our inspection. The one placed first, No. 889, has much substance, and he is both straight in his outlines and deep. The second, No. 888, is a level bull; but he is a little too long in his legs, possibly due in large measure to being rather poor in condition. The reserve bull, No. 890, shows good quality.

The *Female* classes were so exceptionally good, that we requested them to be specially commended as a whole. The *Three-year-old Cows*, though few in number, were remarkably good. The first, No. 893, is almost a perfect specimen of a young Galloway cow. Indeed, looked at from every point of view, she is equally good. The second, No. 894, shows exceptional quality, and stands on short legs. The reserve cow, No. 892, though in such superior company, looked well, being lengthy and very level in her outlines.

Only three *Two-year-old Heifers* were entered. Very seldom, indeed, has a better been seen than the first-prize heifer, No. 897, is in every respect. The second, No. 896, is a heifer of rare quality; while the reserve one, No. 895, is also a good one.

The *Yearling Heifers*, numbering nine, formed a grand class. The first, No. 901, is a beauty, and seems very promising. No. 905, placed second, combines substance and quality in a remarkable degree. The reserve and highly commended heifer, No. 906, is very straight, and altogether symmetrical. We also gave a ticket of commendation to No. 900, a very sweet, stylish young heifer.

MAXWELL CLARK.
THOS. GIBBONS.

AYRSHIRES.

Only a small show of these favourite milkers appeared. Ten entries, with one absentee, competed for 125*l.* in prizes. The Judges' Report deals very fully with the different winners, which comprise 8 out of the 9 animals shown.

Report of the Judges of Ayrshire Cattle.

Ayrshires, though very few in number, were exceedingly choice in quality and merit, and those in competition would have held their own anywhere against the best of the breed.

In CLASS 95—*Bulls from Two to Five Years Old*—there were only two entered, sire and son, and both were forward. The older bull, calved in 1881, was placed first; but both were really first-rate animals, and magnificent specimens of the breed.

In CLASS 96—*Yearling Bulls*—there was only one competitor, but he was well entitled to the first prize.

In CLASS 97—*Three-year-old Cows*—only two of the three entered were forward, and while both were exceedingly good, we had no difficulty in awarding the first prize to No. 912, a perfect beauty, and a model of an Ayrshire.

The *Two-year-old Heifers*—CLASS 98—were very symmetrical indeed, the one awarded the first prize being well-nigh a perfect specimen of a young Ayrshire.

The only *Yearling Heifer* entered was a truly excellent animal, so meritorious and full of promise as to well deserve the first prize.

ANDREW ALLAN.
T. BOWSTEAD.
R. FEARNALL.

DAIRY CATTLE.

For this very interesting competition, in which the prizes were awarded by results, the Council wisely granted a considerable sum, and it is to be regretted that the competition was not more extensive, especially among younger cows and heifers. The first prize went, without much difficulty in selection, to Mr. Joseph Phillips's fine old cow "*Red Cherry*" (No. 919), which scored an easy win in appearance, and satisfied the Judges as to her capacity for the pail, both in quantity and quality. This cow is one of the old-fashioned Lincolnshire red Shorthorns, of which many unpedigreed families exist in that county, but of which the blood is unquestionably pure; and their excellence is attested by the high estimation in which they are held for dairy, grazing, and stall-feeding purposes. She has one point which seems to testify in favour of the Jersey-men's idea of the value of the escutcheon as an indication of milking properties, showing a finely developed one. Her udder is very large and well shaped, the milk veins are highly developed, and the yield of milk is as high as four gallons daily for several months in the year. She is also capable of making a considerable return as beef when her powers as a "milky mother of the herd" shall terminate, and is certainly well worthy the place she gained as the premier Dairy Cow. The remaining competitors do not call for special mention, except for their dairy qualifications, which are fully set forth in the accompanying Table (p. 664) of the quantity and value of each sample with its analysis. All

TABLE OF RESULTS OF MILKING TRIALS OF DAIRY COWS AT PRESTON, 1885.

Letter.	No.	Calved.	Morning Quantity.		Weight.		Evening Quantity.		Weight.		Total Quantity.		Total Weight.		Percentage of Total Solids.
			qts.	pta. gills.	lbs.		qts.	pta. gills.	lbs.		qts.	pta. gills.	lbs.		
A	918	(?)	9	0½ 0½	24		9	1 0½	24½		18	1½ 0½	48½		13.79
B	919	April 23	14	0½ 0	35½		13	0 1	33½		27	0½ 1	69		12.02
C	920	April 3	12	0½ 0	31		13	0 1½	34		*25	0½ 1½	65		10.56
D	921	July 5	9	1 3	25		8	0 0½	21		†17	1 3½	46		14.99
E	922	June 9	14	1 0½	37		13	1 3	35½		28	0 3½	72½		12.77
F	923	May 14	12	1½ 0	32		12	1 0	33		25	0½ 0	65		12.13
G	925	June 24	9	1 0½	25		9	1 1½	25½		19	0 1½	50½		11.96
	917 } 924 }	Absent													
	926	April 25	5	1½ 0	15		did not come up to standard quantity.								

* 920. About 1 pint upset at evening milking.

† 921. Cow only calved ten days previously; quantity ½ gill only below standard quantity, but milk smells very strongly, and is not in fit state for use.

(Signed) J. AUGUSTUS VOELCKER.

July 16th, 1885.

the 7 entries in the Class for Three Cows appeared, and the very good-looking trio of Mr. Cooke, from Cheshire, took first place; the Calthwaite Hall cows of Mr. Harris, second; and the cross-breeds from Preston were third. It is noteworthy that the first and second prizes went in this class to cattle of high pedigree, quite the *crème de la crème* of Shorthorn blood, thus showing that the fears which have been entertained and expressed that high breeding and deep-milking are incompatible, are entirely without foundation.

Report of the Consulting Chemist on the Milk from Cows in Class 100.

Seven samples of milk taken in the Royal Agricultural Society of England's Showyard, Preston, were on analysis found to be of the following composition:—

Mark.	Specific Gravity.	Total Solids.	Fat.
		Per cent.	Per cent.
A 918	1·0325	13·79	3·87
B 919	1·0324	12·02	2·86
C 920	1·0305	10·56	2·24
D 921	1·0339	14·99	4·71
E 922	1·0311	12·77	3·75
F 923	1·0322	12·13	3·21
G 925	1·0294	11·96	3·73

Report of the Judges of Dairy Cattle.

Dairy Cattle: CLASS 100.—The Judges would have liked to see greater competition for the valuable prizes offered for the best cow of any breed, four-years-old or upwards, "giving not less than 18 quarts of milk per day, containing not less than 12 per cent. of solids (including butter-fat)." The seven exhibited were, however, a very useful lot, especially Mr. Phillips's "Red Cherry," No. 919, a Shorthorn, to which we unanimously and without hesitation awarded the first prize. This is just the stamp of cow that dairymen ought to look for, combining, as she does, a well-developed frame, with faultless udder and all the other milking qualities. Her yield of milk, as tested in the Showyard, was 27 quarts per diem; while the quality, according to analysis by Dr. Voelcker, was a fraction over the required standard. "Red Cherry" produced twin-calves on the 23rd of April last, this being, however, only a *repetition* of her fecundity in 1883, in which year, oddly enough, she took first prize for Dairy-cows at the Royal Show at York. Moreover, this cow had produce last year also.

No. 922, the second prize, a rougher cow, had her last calf on June 9th. Her yield of milk was 28 quarts, containing 12·77 per cent. of solid matter. The reserve ticket we gave to No. 921, a very handsome dairy-cow, only ten days calved, with a well-shaped bag. She was somewhat behind in milk-yield, but will make a grand carcass of beef when her time comes. Mr. John Jervis Sharp's crossbred had many Dairy points about her, and she proved well in quantity of milk (26 quarts); but the quality, unfortunately, was considerably below the standard.

In CLASS 101—*Cows calved in 1882*—only one animal was shown, and she did not give the requisite 12 quarts of milk per diem; consequently the prize was of necessity withheld.

CLASS 102. *Three Cows of any Breed or Cross.*—This was a good class throughout, and for the first prize the competition was close. Eventually, however, the premier place was given to No. 931, exhibited by Mr. George Cooke, of Clayley Hall, Cheshire, who showed two massive handsome cows of the true Dairy Shorthorn type, together with a very pretty heifer, barely three years old, in full milk, and again in-calf. Following close on these were Mr. Harris's trio, from Calthwaite Hall, in Cumberland. They were evidently well-bred Shorthorns, showing great propensity to milk, and calculated to prove well at the scale when their breeding-time is over. And this we look upon as a most important consideration in selecting a Dairy-herd. Mr. Edward Holmes, of Bartle, near Preston, was awarded the third prize for three very useful cows; while the reserve ticket went to Mr. John Cottam, of Scotforth, near Lancaster. We considered the whole of the exhibits here highly meritorious, and therefore we commended the entire class.

In CLASS 103, *Dairy-heifers*, only two specimens were presented. Mr. Thomas Atkinson, of Higher House, near Manchester, secured the first prize with a neatly-formed heifer, having a fair show for milk, and likely to grow into a useful Dairy beast.

ANDREW ALLAN.
THOS. BOWSTEAD.
RICH. FEARNALL.

SHEEP.

The show of sheep at Preston mustered an array of 433 pens, against 490 last year, and was slightly below Reading and Carlisle, but in excess of York, Derby, and Bristol. The quality of some of the breeds was most excellent, and generally above an average. The very satisfactory Report of the Inspectors of Shearing states that only one instance of doubt occurred, and that the animal in question was allowed to pass. The Report as to trimming is not so satisfactory; the Council made a decree that lambs shall be shown "untrimmed" (Stock Prize-Sheet, p. 20, No. 16), and consequently the Inspectors were obliged to disqualify 8 pens out of 38 shown, several of these being good short-woolled lambs. This is unfortunate, and this restriction, which does not apply to older sheep, will probably have the effect of deterring exhibitors, should the Classes for Ram-lambs be retained. No such restriction exists elsewhere, and animals which may have taken prizes at Provincial Shows, and are probably the best of their breed, will not appear at the Royal to risk disqualification and consequent loss; and their non-appearance will go far to defeat the chief object of the Society, which is to secure the exhibition of the best specimens of each breed.

LEICESTERS.

There was a larger entry of these sheep than usual, but most of them seemed to lack the style and character which used to be considered "Leicester," and the Judges' Report is by no means

favourable to any but the Class for Shearling Ewes. Mr. T. H. Hutchinson was, as usual, a large exhibitor, sending half-a-dozen Rams, which were successful in both classes, although 20 Shearlings appeared out of 25 entered. The winning sheep, though of good mutton and wool, did not satisfy the onlooker; and all but the first-prize shearling presented an effeminacy of appearance not usual in the sheep of this exhibitor. The Shearling Ewes of Mr. Jordan, first and second, were well fed and showed much quality. The reserve pen, highly commended, were not so fat, and would doubtless have stood higher had they been more forward in condition, being well formed level animals. The Ram Lambs in this, as in the other Long-woolled Classes, did not appear to advantage; and it will be for the Council to consider if these prizes should be continued to any but those breeds which, from locality or climate, can be advantageously brought to very early maturity.

"Border Leicesters" come next in the Catalogue; but as these sheep were judged by the same gentlemen who adjudicated on the merits of Cheviots, the consideration of them is deferred.

COTSWOLDS.

These sheep did not appear in great number, nor was the quality anything specially remarkable, all being fairly good and of average merit. Messrs. Gillett and Jacobs swept the prize-list for Rams and Theaves, having been the only exhibitors. Mr. Russell Swanwick and Mr. Henry Akers each sent contributions to the Ram Lamb Class, in which the latter was successful.

LINCOLNS.

These appeared in greater number than, and of a quality much above the average of, late years. In the Two-shear Ram Class, Mr. Wright's two sheep were drawn first and second, after a lengthened discussion by the Judges as to their relative positions. On reviewing these two sheep, it must be noted that the decision was correct; the first-prize Ram, No. 1031, has great size, substance, and quality, with a fleece of the true "Lincoln-lustre" character; he is remarkably fine in neck and shoulder, and carries himself grandly. His competitor, also from the Nocton flock, is nearly as large and of good quality, but lacks the substance, style, and fleece of the winner. Mr. Smith's reserve and highly commended ram is a fine sheep, but he was overpowered by his more complete rivals. In the Shearlings, a splendid ram belonging to the Executors of the late Mr. Hack took a well-deserved first. He was bred at Willoughby, and his sire is from the old Branston flock, which has furnished so many Royal

2 x 2

winners in years gone by. Mr. Smith's second prize is a fine Shearling, but not equal to the Silk Willoughby exhibit. The Shearling Ewes of Mr. Wright, placed first, are perhaps the finest pen of Lincoln theaves ever exhibited. They are remarkably true to type, of great weight and perfect symmetry; their heads and ears are beautifully uniform, and they carry splendid fleeces of heavy lustre wool. Mr. Smith's second pen, perhaps equally heavy and of much merit, lack the complete and compact appearance of the winners. It must be stated that the show of Lincolns has rarely, if ever, been surpassed. The prize for Ram Lambs went to Mr. Smith, and Mr. Pears was second; but the young ones, like all the Long-woolled lambs, looked miserable at the time of year when the Show is held.

Report of the Judges of Leicesters, Cotswolds, and Lincolns.

CLASSES 104 to 111. *Leicesters*.—The classes of Leicester Sheep, with the exception of that for *Shearling Ewes*, were decidedly below the standard we expected to meet with at a Royal Show. It may be remarked that only one commendation was awarded in the first three classes; but although the *Rams* were very inferior, the *Shearling Ewes* were exceptionally good.

CLASSES 112 to 115. *Cotswolds*.—Only a few sheep in each class, and the merit not exceptionally high.

CLASSES 116 to 119. *Lincolns*.—The prize-winners in the *Two-shear Class* were sheep of very great merit, and the same may be said of the first-prize sheep in the *Shearling Class*. The Judges highly commended three sheep; but the rest were only moderate. The Judges considered the reserve number in the *Shearling Class* so nearly equal in merit to the second-prize winner, that they recommended a third prize to be given. The *Shearling Ewes* were most excellent, every pen being of a very high character.

WM. SANDAY.

H. MACKINDER.

THOMAS THORNTON.

OXFORDSHIRE DOWNS.

These fine sheep, which seem to unite the quality of the Southdown with the size of the Cotswold, appeared in about average number and uniformly fine quality. The cautiously worded Report of the Judges deals with the winners in each class, and the noteworthy feature in this department of the Show was the success of Mr. Treadwell, who with 8 entries scored no less than six prizes, and highly commended and commended cards, being first and reserve with Two-shear Rams, and first, second, reserve, and highly commended, in Shearlings. It must be stated that this shower of honours was fairly deserved, as probably so fine an individual contribution to the Show of this breed has never before appeared. Most of the entries in the Ram Classes are pedigreed, and this must add to their value for flock purposes. Mr. Brassey was second in the Old Ram Class with a useful sheep.

The Theaves of that gentleman are very good, and deserve the notice they received. There were but four entries, but all were commended, those of the Countess of Camperdown being very neat specimens of great weight and quality; the Ram Lambs of Mr. Arkell were fair; but Mr. Brassey's pen was unfortunately disqualified.

Report of the Judges of Oxfordshire Down Sheep.

Although the Show was held at a considerable distance from the localities in which this useful breed of sheep is usually found, the entries were, on the whole, fairly numerous, and the quality was quite up to the standard of excellence to which the breed has attained.

In the Class for *Two-shear Rams*, the first-prize sheep is of good character and symmetry, but is somewhat loose underhand; the second prize and the reserve number are not of any special merit.

In the Class for *Shearling Rams* there was an entry of 17, which, with few exceptions, are good specimens of the breed. The first-prize ram is a very smart sheep, and a true type of its breed; the second-prize animal is of equally good type and character, but not so true in form; the reserve number and highly-commended sheep are also excellent specimens of the breed.

In the *Ram Lamb* Classes there were four entries only, which do not call for any special remark; but it is only fair to add that if No. 1080 had not been disqualified for trimming, it would have stood high in the prize-list.

The *Shearling Ewes*, though comprising only four entries, are all of special merit, and good representatives of the breed.

J. P. CASE.

W. D. LITTLE.

SHROPSHIRE.

These favourites of the West appeared in force, and although not in the numbers which made the Shrewsbury Show so memorable, yet the entries at Preston were considerable. There were altogether 142 entries, comprising 246 sheep. The *Two-shear Rams* did not include any animals of commanding excellence, except the winning two, of which the first was by far the best. "The Judge" of Messrs. Bradburne is a very neat sheep, with well-developed frame on good legs. The second and third prizes went to Messrs. Minton and Mansell respectively, for sheep which did not seem equal to those of last year. In the *Shearlings*, a grand Class of 91 entries appeared, and of course the Judges had some trouble in arriving at a decision in so large an assembly. They eventually gave the first prize to Mr. Joseph Beach, for a beautiful though rather small sheep; next came Lord Chesham, with another of the same character, with wool of a somewhat closer nature; then Messrs. Bradburne got third, for a sheep of somewhat different type of mutton, coat, and countenance. Mr. German got reserve and highly commended; and three highly commended cards and five commendations were dis-

tributed in this very strong Class. The remark made with regard to the Long-woolled Lambs may be taken to apply to Shropshires. Although the entries numbered 14, 3 were absent and 4 unfortunately disqualified. The Judges' opinion of the merits of the Shearling Ewes may be gathered from the fact that they favourably noticed no less than 11 out of the 17 pens. Lord Chesham took first prize with a pen of beauties, of somewhat smaller type than have been successful previously. The only fault that can even be hinted at is a slight difference in the form of countenance of one of them, which detracted from their absolute uniformity, so desirable in a first-prize pen in such a competition. The second prize went to Mr. Edward Farmer for a pen very nearly equal to the winners, which possess a little the more quality. Messrs. Bradburne were third, with good ones; and the reserve and highly commended card went to a very noticeable and strong pen of Mr. T. J. Mansell, from the Dudmaston flock, not previously exhibited. The show of Shropshires, although of great merit, did not mark a distinct advance on the great exhibition of last year.

Report of the Judges of Shropshire Sheep.

The Judges have pleasure in reporting that the *Shropshire* sheep, upon the whole, fully maintained the reputation of former years.

CLASS 124.—*Two-shear Rams*—containing 18 entries,—was not a good class; there being few animals of any great merit. The prize-sheep are good in their coats and character, but lack finish.

CLASS 125. *Shearling Rams*.—This was a very good class of sheep, containing 91 entries. The first-prize and second-prize sheep are exceptionally good, possessing beautiful form, style, and character, with great depth of body, and legs well set on. The commended sheep are a lot of good animals, with true Shropshire type.

CLASS 126. *Ram Lambs*.—This was not altogether a satisfactory class. It contained 14 entries, of which 4 were disqualified in consequence of trimming. Amongst the prize-pens there are a few promising animals.

CLASS 127. *Shearling Ewes*.—This was an extremely good class. The prize-pens are magnificent sheep, possessing great scale, beautiful form and quality, with true Shropshire character. The commended-pens are good, carrying the true Shropshire type and fleece.

CHARLES COXON.
C. RANDELL.

SOUTHDOWNS.

Entries of this favourite and fashionable breed were in considerable numbers, and hailed from Norfolk, Suffolk, Essex, and Gloucestershire, as well as from the district which used to be considered their home. The first prize went to Norwich for a Two-shear Ram of very superior quality, belonging to Mr. Colman, M.P.; H.R.H. the Prince of Wales was placed second, with a sheep of similar character from Sandringham; Sir William

Throckmorton took third, with a neat Berkshire; the same gentleman being first and second in the Class for Shearlings, a very strong one of 17 entries, in which Mr. Colman got third, and the Prince reserve and highly commended. His Royal Highness also showed a pen of useful Ram Lambs, which took the prize, the other entry being disqualified. Competition in the Shearling Ewes was keen, the beauties selected being of fair size, splendid quality, and not too fat. Here again Norfolk and Berkshire were to the front, Mr. Colman and Sir William Throckmorton winning; the third prize went to Gloucestershire, for a nice pen belonging to Mr. Chapman. It goes without saying that these sheep were of the finest quality, and the size of the breed appears to have increased somewhat of late years.

HAMPSHIRE DOWNS.

Representatives of this early breed did not appear in large numbers, and it is unfortunate that of the really fine specimens of lambs shown, three out of the four pens were disqualified. Why should the young sheep of so valuable a breed be denied the toilet assistance which is so liberally accorded to their elders throughout the stockyard. If disqualification for trimming is to be continued, I think it will only be right to extend it to the practice of colouring the Short-wools, and the still more objectionable habit of oiling and greasing the Leicesters and Lincolns until they are literally not fit to touch. The colours of the Hampshire Downs were not so flamingly obtrusive as last year; but it would be much better if the sheep were shown with fleeces of the natural colour of the land on which have been fed, or at least of the district from which they come. The Ewes of Mr. Frank Moore were deservedly placed first in a small class.

Report of the Judges of Southdown and Hampshire Down Sheep.

CLASS 128.—Good.

CLASS 129.—A class of very good sheep. First- and second-prize sheep very well grown, and of good quality.

CLASS 130.—Only one pen to judge—the other pen being disqualified by the Inspector of Shearing.

CLASS 131.—A very good class; many pens being of good size, quality well preserved; and the principal prize-pens were in a condition fit for breeding.

The *Hampshire Down Rams* call for no special comment. There were two pens of good *Shearling Ewes*.

JOHN A. HEMPSON.
S. W. TAYLOR.
THOS. COOPER.

BORDER LEICESTER AND CHEVIOTS.

These two varieties were placed under the same set of Judges. Of the former breed there were 23 entries, and of the latter 10. Lords Arthur and Lionel Cecil showed in both kinds, and won with a fine Cheviot Ram. The Border Leicesters are handsome sheep of large size and fair fleece. They are used for crossing with the native breeds of the hill districts, and their owners claim for them purity of blood for at least a century. Mr. Robert Wallis's fine Shearlings were put first and second, and Mr. Twentyman was very successful. The Cheviots were from both sides of the Border, and some good specimens of the race were shown.

Report of the Judges of Border Leicesters.

CLASS 108. *Border Leicesters*.—We found in the Four Classes for Border Leicesters some very good animals, especially the *Shearling Rams*, which was the best class, but no class was largely represented. *Cheviot Sheep*, CLASSES 136 and 137 were good, but small entries.

JOHN DAVISON.
GEORGE REA.

Of the Ryelands from the plains of Herefordshire; the enormous unshorn Lonk, weighing, according to his attendant, $3\frac{1}{2}$ cwt.; of the Grey-faced and Black-faced mountaineers; of the superlatively active Welsh; and of the diminutive Herdwicks,—all of which competed for valuable prizes offered for the most part by the Preston Local Committee, not much can be said, but what is supplied by the Report of the Judges of this miscellany. An exception must be made, however, in noticing the fine pen of Suffolk Theaves shown by Mr. Joseph Smith, of Woodbridge. These are evidently a variety of such merit as should be recognised by a separate class in the Prize-list, combining, as they do, a large quantity of mutton of fine quality with a fleece of more than medium weight, and being also extremely valuable for purposes of cross-breeding. Mr. Smith was successful with sheep from Suffolk, both at Shrewsbury and York; and the Judges' Reports in both those instances were of a favourable character.

Report of the Judges of Grey-faced, Black-faced, and Welsh Sheep.

CLASS 138. *Rams*.—Two distinct breeds of sheep were shown against each other, both good of their respective breeds, but difficult to place in competition with each other.

CLASS 139. *Ewes*.—The *Suffolks* in this class were of high merit.

CLASS 142. *Shearling Ewes*.—Four pens of good sheep.

CLASS 143. *Rams of the Black-Faced Breed*.—A good stamp of sheep, well-made and well-woolled. The *Shearling Ewes* in this class were of high merit.

CLASSES 145-6. *Welsh Sheep*.—Both *Rams* and *Shearling Ewes* of ordinary merit.

JOHN CLAY.
ROBERT PATERSON.
DAVID DAVIES.

WENSLEYDALE.

These, the last heading in the Catalogue of sheep, competed for prizes offered by the Local Committee: only five Rams and two pens of Ewes were shown. These "bonny bluecaps" attracted much attention. They are great favourites in the Craven district, and have the peculiarity of blue or black mottled skins with white wool, and of fine carriage and great size. The Rams of Mr. Lambert and Mr. Pilkington, both from Bedale, are very fine fellows, and did not appear to disadvantage amongst the different breeds exhibited. The Ewes also are pretty specimens of a breed which is evidently increasing in the estimation of breeders of sheep "in the North Countrie."

Report of Judges on Lonk, Herdwick, and Wensleydale Sheep.

In the *Lonk Class* we were sorry to see such a poor entry; but we think we were recompensed by finding some of the best *Shearling Ewes* that have been exhibited at the Royal Show for several years.

The *Herdwicks*, on the whole, were a fair class. The animals to which prizes were awarded were of good quality, and showed marks of that pure breeding which is so essential in these sheep; any cross or admixture of other blood, however slight, making the Herdwick less able to endure the hardships of winter on the Lake District mountains.

The *Wensleydale Rams* were exceptionally good, and we had great difficulty in deciding. The first prize we gave to a *Shearling Ram* (which is very unusual), one good in every point, both as regards symmetry and wool. The second prize was a *Two-shear*, a remarkably good sheep, and, taking the whole class together (though small in number), they have never hitherto been exceeded.

In this Class the *Shearling Ewes* (though we were sorry to find only two entries) were exceedingly good. The first-prize Ewes were the best that we have seen at the Royal Show for many years. The second-prize Ewes were well deserving.

Before concluding our remarks we should wish (if friends would allow) to separate *Shearlings* and *Aged Rams*, as it is almost impossible to give satisfaction, and, more than that, they are difficult of judgment.

JOHN INGLEBY.
JAMES PICKARD.
HUGH P. HOLME, M.R.A.C.

Reports of the Inspectors of Shearing.

We, the undersigned Inspectors of Sheep Shearing, have to report that we have, after careful examination of the sheep in the Yard, to congratulate the Council on the marked and satisfactory improvement in the shearing of sheep from year to year. The only sheep we could have recommended for disquali-

fication was an aged Border Leicester Ram, and on our second examination of the sheep referred to, we gave the Exhibitor the benefit of the doubt, and allowed him to pass. We are glad to say the improvement is very great indeed. We still find dressing to go on freely in the Yard, and would again venture to ask the Council not to allow dressing with wool shears during the time of the Show.

The dressing of Lambs has been carried out to a large extent, so that we had to recommend for disqualification—in CLASS 122, No. 1080; CLASS 126, Nos. 1201, 1202, 1203, and 1204; in CLASS 130, No. 1625, and CLASS 134, Nos. 1294 and 1295. As previously stated, and as contrary to the rules of the Society, several lots were very much trimmed, which we consider takes from their good appearance at the time of the Show.

WILLIAM JOBSON, }
W. B. WORKMAN, } *Inspectors of Shearing.*

PIGS.

It must be admitted that the show of Pigs was on the whole disappointing. There were many absentees, and although the number of animals entered was considerable, many individual specimens were not of the standard excellence observable on former occasions. The prevalence of swine-fever may have had something to do with the non-appearance of many valuable pigs, and so have reduced the actual Show to smaller dimensions than the entries promised.

LARGE WHITE BREEDS.

The competitors in the first Class for Boars were reduced to two, and Mr. Davies's "Jonathan" got promotion from his Shrewsbury position. He is now a good well-fleshed pig. His opponent, "Samson," was chiefly remarkable for his enormous size and fatness, and his strength certainly does not lie in his hair, he being nearly destitute of that ornament. In the Younger Class, Mr. Ashforth won against a single competitor with a neat boar, but with a snout too prominent. The Sow Class had more competition, Colonel Platt getting first with "Sal," the enormous animal which won at Shrewsbury. Mr. Duckering's sow, placed third, is a more taking animal than either of those before her. Mr. Walker-Jones's reserve is very large, with a nice litter, and was thought by some to merit a higher place. The Pens of Breeding Sows had eight appearances. The winners may be classified as second, "bare;" third, "bristly;" and the first, Mr. Walker Jones's, uniting both these characteristics.

In Middle Whites, a useful boar, with a good head, of Mr. Newsham's, was placed before a more compact one of Mr. Ashworth's. The Breeding Sows had 12 pens, headed

by a really good sow, with plenty of quality of flesh and hair. Mr. Walker Jones and Colonel Platt followed with two about equal, in a good class, in which eight animals received favourable notice. Of the Younger Sows, the very neat pen of Mr. Nuttall were much admired.

The Small Whites showed distinctly below the average, and appear to be losing the uniformity of type which formerly distinguished them. Mr. Ashcroft's boar is a good square animal; but the third-prize pig, bred by Lord Ellesmere, was by many preferred to the winner. The Queen exhibited in this class, obtaining the reserve for "Regulus," a neat pig. Lords Moreton and Radnor alone competed in the next class, the former winning with a boar which does not show the very perfect form of head and snout of former Tortworth Court pigs. Several Sows appeared, and Mr. Walker Jones and Lord Radnor won in a fairly good class.

Report of the Judges of Pigs of the White Breeds.

CLASS 151.—Only two exhibits.

CLASS 152.—First-prize pig very level in flesh, faulty in his head. Only two exhibits.

CLASS 153.—A large class of very good animals.

CLASS 154.—With the exception of the first-prize pen, this class was not quite true to character.

CLASS 155.—In this class we found a pig of great merit, which ought to have been exhibited in the Large Breed Class. The first-prize winner in this class was a very good animal.

CLASS 156.—Only one pig was exhibited in this class, which we did not consider of sufficient merit for a first prize.

CLASS 157.—A large and extraordinary good class.

CLASS 158.—A very moderate class.

CLASS 159.—A fair class.

CLASS 160.—Only three exhibits, of no special merit.

CLASS 161.—A fairly good class.

CLASS 162.—Three pens of nearly equal merit. In this class we recommended the Council to award a third prize.

On the whole we consider the show of White Pigs considerably below the standard of former years, many exhibits being absent. We are glad to notice that in all the classes in which we have adjudicated there are only two disqualifications.

JOHN ARGUS.

JOHN BARRON.

GEORGE MANGLES.

Black Pigs.—In the Small Blacks, the success of Mr. Duckering was complete, he taking firsts for both Classes of Boars and for Breeding Sows. Berkshires were well represented, in all 56 entries, but there were many absentees. The non-appearance of Lord Ellesmere's Whites from the preceding classes was very noticeable, and so was the absence of Mr. Benjafield's Blacks. Mr. Edward Tombs headed the

list with a somewhat coarse boar, beating Colonel Lane and Mr. Swanwick, whose pigs showed more quality. Mr. Tombs also got first with a very grand young boar. The Breeding Sow Class was well filled, a very neat blue-skinned sow of Mr. Corp's winning, with six others mentioned. This was the strongest class of the Show; the pigs were very fat, and the same remark applies to the pens of three of this breed. It seems impossible to win prizes with any but animals as fit for butchering as breeding.

In the so-much improved Tamworths, Mr. Allender was, as might have been expected, well-nigh invincible, winning most of the prizes with fine specimens of this breed, which is so rapidly advancing to the front as most profitable bacon-producers.

Report of the Judges of Black, Berkshire, and Tamworth Pigs.

CLASS 163.—First prize, nice character, hair, and form; second prize is a useful pig of fair character.

CLASS 164.—Not a good class. First-prize pig rather coarse in his shoulders.

CLASS 165.—A good class. No. 1481, a beautiful sow, quite first; No. 1479, a nice sow, but rather small; No. 1484, a very nice sow, with a few white hairs, which we considered denoted impurity of breed, therefore did not award her a prize. Nos. 1485 and 1486 very good specimens of the breed.

CLASS No. 166.—No. 1487; a patchy pen.

CLASS 167.—Not a good class; very unsatisfactory to judge.

CLASS 168.—First prize, a very good pig, far away the best in the class; the remainder being indifferent.

CLASS 169.—Nos. 1519, 1530, and 1522 were three very good specimens of the breed. The first-prize sow being quite in character of the breed—wide, long, low, and full of hair; the second prize was a deep good sow in beautiful form; the third-prize sow, having bred pigs, did not appear so youthful. This class contained several good specimens of the breed.

CLASS 170.—Three pens in this class showed symptoms of impurity of breed—black tails appearing in each lot, which, in our judgment, is not characteristic of the breed. The first-prize pen were good; the markings being just sufficient to entitle them to take their position.

CLASSES 171, 172, 173, and 174.—The *Old Boars* did not impress upon our minds that they were a class of pig desirable to breed from. The *Sows* certainly were an improvement, particularly No. 1557, which showed some amount of symmetry.

JOSEPH SMITH.
JOHN TREADWELL.
RICHARD FOWLER.

Report of the Veterinary Surgeons on the Dentition of Pigs.

Having examined pigs in pens Nos. 1426, 1454, and 1477, we certify that the state of the dentition indicates the age to be above that stated in the certificate of entry.

WM. ROBERTSON.
W. DUGUID.
G. T. BROWN.

ABSENTEES.

The number of absentees was so considerable, that a percentage table is presented: this shows that the should-be exhibitors of pigs are the greatest sinners; next to them are the owners of cattle, and it is to be noted that the Jersey classes alone show absentees amounting to $27\frac{1}{2}$ per cent. of their number. Surely this is a greater number than necessary, and it must be remarked that, in addition to the unreasonable expansion of the stockyard and its consequent expense, "the beggarly account of empty boxes" does not afford by any means a satisfactory spectacle:—

Preston Showyard, 1885.

Horses, &c.	..	438	
Absent..	..	79	= 18 per cent.
Cattle ..	..	539	
Absent..	..	112	= nearly 21 per cent.
Sheep ..	..	433	
Absent..	..	47	= more than 10 per cent.
Pigs ..	..	203	
Absent..	..	46	= more than 22 per cent.

List of Absentees.

HORSES.

Nos. 8, 20, 28, 31, 33, 38, 42, 47, 50, 52, 56, 60, 68, 70, 72, 73, 74, 75, 100, 109, 138, 138*, 147, 147*, 153, 155, 156, 158, 165, 168, 188, 189, 193, 201, 203, 205, 208, 215, 220, 227, 228, 233, 234, 236, 237, 239, 244, 247, 248, 254, 255, 262, 263, 268, 275, 294, 298, 299, 301, 302, 306, 308, 309, 311, 312, 315, 322, 323, 332, 333, 342, 351, 355, 357, 364, 378, 381, 400, 401.

CATTLE.

Nos. 409, 415, 420, 425, 427, 429, 432, 434, 440, 444, 452, 456, 465, 468, 469, 470, 471, 475, 479, 482, 484, 487, 502, 505, 511, 516, 523, 536, 538, 541, 542, 550, 552, 557, 559, 561, 572, 573, 589, 591, 598, 600, 601, 604, 607, 616, 620, 621, 623, 635, 636, 644, 645, 646, 649, 656, 657, 661, 663, 670, 677, 698, 701, 702, 703, 714, 718, 724, 728, 736, 738, 739, 741, 749, 751, 752, 756, 757, 760, 761, 762, 776, 779, 781, 794, 795, 797, 798, 799, 805, 807, 808, 820, 823, 824, 826, 828, 833, 835, 836, 844, 846, 849, 879, 880, 898, 904, 914, 917, 924, 935.

SHEEP.

Nos. 943, 947, 951, 952, 953, 961, 962, 986, 1017, 1027, 1055, 1056, 1072, 1085, 1093, 1106, 1108, 1109, 1121, 1125, 1126, 1127, 1128, 1129, 1130, 1131, 1139, 1148, 1149, 1151, 1160, 1161, 1162, 1176, 1185, 1188, 1206, 1209, 1212, 1223, 1231, 1238, 1246, 1291, 1293, 1294, 1295.

PIGS.

Nos. 1367, 1368, 1369, 1372, 1381, 1382, 1383, 1385, 1387, 1392, 1401, 1402, 1403, 1414, 1415, 1416, 1420, 1424, 1428, 1431, 1432, 1436, 1440, 1442, 1448, 1449, 1450, 1451, 1460, 1464, 1468, 1471, 1478, 1482, 1495, 1499, 1500, 1511, 1516, 1517, 1518, 1528, 1533, 1535, 1541, 1545.

POULTRY.

Nos. 2, 24, 25, 42, 43, 44, 46, 48, 123, 134, 138, 139, 184, 185, 188, 189, 201, 205, 209, 219, 237, 270, 274, 297, 298, 304, 312, 324.

CHEESE AND BUTTER.

For the first time the show of Dairy Products reached something like the dimensions expected at the "Royal," and a marked increase of interest was shown by the many who visited the spacious tent in which the competing specimens were placed. As success or failure could only be learned from the prize cards surmounting the strongly wired lots, and as the discussion of cheese and butter, without necessary adjuncts, is of a somewhat trying nature, the merits of the different samples must be inferred from the decisions and Report of the Judges. The Society is much to be congratulated on the success of the Council to give that prominence to Dairy Farming which the importance of the subject demands; the handsome premiums of 162*l.* for Cheese, and 40*l.* for Butter, have had the effect of bringing out many additional entries. The Report of the Judges, which is full of interesting details, deals with the subject in an exhaustive manner; and the "thoroughness" with which those gentlemen performed their delicate and somewhat difficult duties is very noteworthy.

It will be seen that they do not report very satisfactorily of some of the exhibits, and their determination not to award prizes where they were of opinion that sufficient merit did not exist, should have the effect of inducing competitors in the art and mystery of cheese and butter making to exert themselves to satisfy the requirements of the Society's Judges. By so doing

they would ensure for themselves considerable pecuniary benefit from the enhanced price paid by the consumer of first-class dairy produce, the want of which, of home manufacture, has long been a reproach to the great industry of which it is an outcome.

Report of the Judges of Cheese and Butter.

We consider CLASSES 175 and 176 fair and satisfactory.

CLASSES 177 and 178 were well filled with high-class cheese, and very good representative qualities. We consider these classes well worth the fostering care of the Royal Society.

CLASSES 179 and 180 were well filled, and generally of satisfactory quality.

CLASS 181.—Only moderate supply of medium quality.

CLASS 182.—Only two samples, which we did not think worthy of any prize.

CLASS 184.—Only five samples shown, which we considered of insufficient merit to cause us to give a first prize. We have awarded a second prize. We may remark that it is too early to judge of this class of cheese, in our opinion.

Query.—If such is the fact, is it desirable to offer prizes of 10*l.* and 5*l.* for this class?

CLASS 185.—Only three samples shown, and these not suitable for competition; all being of different descriptions.

CLASS 186.—No merit; not answering the description.

CLASS 187.—Six competitors; but it is most difficult to arrive at the merit of this class; the best not being purely skim-milk cheese—a more clearly defined description of skim-cheese is desirable.

CLASS 190.—Eighteen exhibits; none of which had sufficient merit to induce us to award a prize.

JAS. WATSON.
G. W. BURROWS.
WM. BOYD.

HIVES, HONEY, &C.

The exhibition of Bee-keeping Appliances showed considerable advance, the number of entries being 104, against 72 in 1884, and 56 at York. Much interest was evinced in the manipulation of these aids to industry during the “driving parades” which took place at stated periods. A much larger space than has previously been necessary was allotted to this department, and the Judges’ voluminous Report testifies to its merit. The samples of Honey in Jar, Section, and Super looked remarkably tempting, and the whole show formed an agreeable variation in the routine of arrangements.

Report of the Judges of Bees, Hives, and Honey.

We have much pleasure in congratulating the Royal Agricultural Society on the continued success of the Bee Department in connection with this annual Show. The exhibition of Bees, Hives, and Honey for competition at Preston showed most decided advances on previous years.

In CLASS 191—*For the best Frame Hive of a substantial character for general use in an Apiary, with arrangements for Summer and Winter use*—there were 15 exhibits. No. 286 taking first prize for a well-made and substantial hive; No. 283, second; No. 282, third; and Nos. 290, 291, 294 were commended. The price of these hives did not exceed 15s. each.

In CLASS 192—*For the best Frame Hive for Cottagers' use, with arrangements for Summer and Winter (price not to exceed 10s.)*—there were 14 entries. No. 300 was awarded first prize; No. 297, second; No. 298, third; and commended, Nos. 305 and 308.

The prize-hives in both these classes were well made, of good materials, and were remarkable for their simplicity.

In CLASS 193—*For the best Collection of Hives and Bee Furniture most applicable to modern Bee-keeping (no two articles to be alike)*—there were four entries. The first prize was awarded to No. 313 for a very fine collection; second prize to No. 312; and third to No. 311.

In CLASS 194—*For the best Super of Honey (not being a Sectional Super)*—there were 12 entries. The first prize going to No. 326; second, to No. 325; and third to No. 319, and highly commended.

In CLASS 195—*For the best twelve 2-lb. Sections of Comb Honey*—there were 12 entries, and we had no hesitation in awarding the first prize to No. 329; second to No. 327; third to No. 338; and highly commended No. 336.

In CLASS 196—*For the best twelve 1-lb. Sections of Comb Honey*—there were 24 entries. No. 345 receiving first prize; No. 341, second; No. 359, third; and No. 343 being commended.

We would take special notice of these two classes, in which the competition was very keen, and mention that the prize-sections were beautifully even and regular; the first-prize ones in both classes being perfect in every way. We would also recommend that all sections be glazed, so as to protect them from bees, and also from the public.

In CLASS 197—*For the best exhibition of Run or Extracted Honey in twelve 2-lb. or twenty 1-lb. Glass Jars*—there were 21 entries. Nos. 364 and 366 being disqualified, owing to there being in the one only 12, and in the other only 16 1-lb. jars, instead of 24. The first prize was awarded to No. 368, honey of exquisite flavour, and of a pale amber-colour, perfectly clear and transparent; second prize to No. 380; third prize to No. 383; highly commended, No. 369; and commended, No. 376.

The honey in this class varied greatly in colour and flavour, according to the blossoms from which it had been gathered.

We should here recommend that in future this class be divided into two classes, separating the 1-lb. from the 2-lb. jars, by which the number of entries would most likely be considerably increased.

In CLASS 198—*For the best sample of Comb Foundation made of pure Beeswax, in the presence of the Judges*—there were two entries; but only one exhibitor complied with the requirements. There being no competition, and the foundation made not coming up to the proper standard, only the second was awarded to No. 385.

The exhibition, on the whole, was a remarkably good one; and, judging from the numbers of people always round the exhibits, it was an attractive one, and is likely to do much good in promoting bee-keeping in the neighbourhood.

THOS. WM. COWAN.
JOHN M. HOOKER.
R. R. GODFREY.

XXIX.—*The Poultry Show at Preston.* By JAMES LONG,
of Graveley Manor, Stevenage.

THE rise and growth of exhibitions of domestic poultry in Great Britain during the past thirty years is one of the most distinct signs of the inherent tastes of our people, who, more than those of any other country, have cultivated domestic animals with so much success. The ramifications of Poultry Shows have extended to every county, almost every town, and every agricultural society; but the support of the Royal Agricultural Society was wanting, so it was urged by those who hold positions of authority on poultry matters, to give the stamp of importance and authority to the organization. It is needless to say that the Royal Agricultural Society could not lend its countenance to the support of a purely "fancier's" meeting for the encouragement of such qualities as colour, feather, and marking in fowls—although this was the line that some of those who had pressed the matter upon the Council had chosen to take. It is somewhat unfortunate that the majority of English poultry exhibitors, in the pursuit of their hobby, entirely ignore the end for which poultry exists, and are too fully persuaded that the English system is the only correct one. To the outsiders who, while interested in poultry as a food production, understand the relative merits of the economical systems of other countries, the faults of the English plan are apparent. When therefore it was announced that the Council of the Royal Agricultural Society had decided to include a Poultry Exhibition in their programme, and to conduct it upon lines somewhat opposed to those commonly accepted by exhibitors, some astonishment was felt by many persons. It was, however, subsequently seen that their objections were groundless, and that the exhibition was carried out in the only practical way for an agricultural meeting. In place of a tent, a substantial building was erected, in which the birds were sufficiently protected; whereas the cages, instead of the usual small pens of galvanized iron, were very large and built of wood, with openings only at the back. This is almost the only point in which an improvement might be made. For the convenience of the Judges the fronts might be made to open also, by means of galvanized-wire doors, which, however, should be permanently fastened when the Judges had completed their duties. The feeding was very properly conducted at the back of the cages, in an alley which divided the two rows placed back to back. The building was well ventilated by an opening at the eaves, which, however, was covered with wire-netting to prevent the escape of birds—a very thoughtful proceeding.

The Prize Schedule required a cock and three hens to be exhibited in each instance, if we except the Game, in which cocks were shown separately, and Ducks, Geese, and Turkeys, in which three birds constituted an entry. The entry fees were much lower than those charged for similarly high-class exhibitions, whereas the prizes were decidedly more liberal. The arrangement of the classes, although generally good, would be improved by the introduction of classes for Minorcas, La Flèche, Scotch Greys, Pekin Ducks, and fowls of a first cross suitable for the table. Divisions might also be made in the Cochin and Hamburg classes—the latter, although birds of feather, being among the best-known layers. Although July is an exceptionally bad month for a Poultry Show, the display was extremely good, many of the principal breeders in the country sending birds of very high merit. The best classes were the Dorking, Plymouth Rock, Hamburg, Brahma, and Game. Polish also were extremely good, but they are essentially ornamental poultry. Without doubt, the majority of the classes will in future be better represented, as breeders will make a point of producing birds especially for the Meeting. Mention should not be omitted of the very good arrangements for feeding and care of the birds, and of the ingenious water-fountain employed, I believe, for the first time. This was an inverted wine-bottle, beneath which was a metal pan, in which the water was kept unusually clean; it could not be knocked over by the birds, whereas crested fowls were able to keep their crests perfectly dry.

The year 1885 will be memorable from the installation of a Royal Show which, based upon the principle of utility, is certain to exert considerable influence upon the future history of Poultry Exhibitions.

XXX.—*Report of the Senior Steward of Implements at Preston.*

By the Hon. CECIL T. PARKER, Senior Steward.

IN beautiful weather the Show of 1885 was opened to the public on Tuesday, July 14th. The inhabitants had adorned their town with an immense display of bunting, and everything that was possible was done by them to make the Royal Agricultural Society's Show of 1885 a success, and in this they fully succeeded. On the Friday and Saturday previous, the Working Dairy was opened for the practical examination of cheese-makers, who might be desirous of obtaining the Society's certificate of merit.

Two only presented themselves ; it is much to be desired, if the Society give the opportunity, there may be greater competition another year.

No representative maker of any one of our national cheeses attempted to gain the Society's certificate.

Both candidates hailed from Scotland, and both worked on American systems. The thought comes to one's mind, Should the Society encourage American systems of cheese-making? A great many would, I know, agree with me, and answer in the negative.

The Judges were Mrs. Gibbons and Mrs. Nuttall, two of the most skilful and successful cheese-makers in the kingdom.

On Monday, the 13th, the Working Dairy was again open for the examination of butter-makers.

Six entered, but only five presented themselves.

The Judges were Miss Smithard and Mrs. Travis, who awarded as follows :

1st. Mary Hird Ward, of Halsnead Park Farm, Prescott, Lancashire.

2nd. Walter Thomas Tomlinson, of 22, Hough Lane, Broughton, Manchester.

3rd. William Henry Knight, 1, Russel Villa, Russel Street, Gloucester.

Commended. Mary Jane Hailwood, 119, Lower Broughton Road, Broughton. Manchester.

I should mention that Mary Ward was a pupil at Lord Vernon's Dairy School at Sudbury. I have since learnt that her father has sent her back there, to learn as much more as she can of all kinds of dairy work.

The entire Show was opened on Wednesday. The Working Dairy, under the able management of Miss Smithard, maintained its popularity, being crowded with visitors the whole time, in the part which was open to the general public. Three hundred gallons of milk came into the Dairy daily ; this large quantity having been set or separated, the cream therefrom was made into butter, all being quickly disposed of.

The Aylesbury Dairy Co. ran the smallest size of Danish Separator, capable of separating 20 gallons of milk per hour, and which can be worked by a donkey.

The Dairy Supply Company ran the well-known Laval Separator.

The Marian Hardening Box, designed by Miss Smithard, exhibited for the first time, was purchased by H.R.H. the Prince of Wales, who visited the Dairy on Thursday.

THE "MARIAN" BUTTER HARDENING BOX, manufactured by *The Aylesbury Dairy Company, Limited*, 31, St. Petersburg Place, Bayswater, London, W.

This Refrigerator has been designed to meet a want long felt in localities where ice is difficult to be obtained.

It consists of a square wooden box, having a zinc tray at the top and

of water, which may be supplied either from a tank at a higher level or by hand. When in use the upper tray is filled, and the water conducted by means of a tap and spreader down one end of the trough, which is covered with zinc, into the lower tray, where, after again running the whole length of the box, it is discharged through a waste pipe. The butter is placed inside the box on a movable wood grating resting on a ledge about a couple of inches from the perforated bottom, so as not only to admit of drainage from the butter, but also to allow a current of air to sweep beneath, as well as above, and around it. Price, £4 4s.

The engine which worked the machines in the Dairy was Messrs. Hathorn & Davey's "Domestic Motor," of four-horse power, which they kindly lent, and of which a description will be found elsewhere. Needless to say, it did the work required efficiently and noiselessly.

Fewer novelties than usual presented themselves to the visitors this year.

The Stewards and Judges have remarked an increasing tendency on the part of exhibitors to enter some of their articles as New Implements, without considering their claim to rank as such, and without taking into account the waste of time of the Stewards and Judges, and the additional expense necessarily incurred by the Society for no useful purpose. The Judges naturally complained last year in having to visit one stand, where three grindstones and a wheelbarrow were exhibited; to all of which the words "New Implement" were prefixed in the Catalogue.

This year a new rule was enacted, on the recommendation of the Stewards of Implements, at Shrewsbury, in accordance with which a deposit of one pound must accompany each entry of a "New Implement." This deposit is returned if the Judges certify that the implement is new, within the Society's definition.

To show how very necessary this rule was, although more than one hundred implements were entered as new (less than one-third the number so entered at Shrewsbury), a considerable proportion could not pass muster, although the rule has been very liberally interpreted in this the first year of its operation.

The Judges awarded four Silver Medals as follows:—

To Messrs. Hathorn & Davey, of Leeds, for their "Domestic Motor."

To Messrs. Hornsby, of Grantham, for their Drainage Plough.

To Messrs. W. Rainforth & Sons, of Lincoln, for their Flat Adjustable Corn Screen.

To Messrs. Maynard, of Cambridge, for their Patent Automatic Feeder for Chaff-cutters.

At present this feeder can only be attached to the chaff-cutters manufactured by Messrs. Maynard, but no doubt a plan will soon be devised to attach it to ordinary chaff-cutters.

The Society offered three Prizes for Harness and Gears; it

is matter of regret that there was not a single entry. Very few persons have any idea of the weight of farm harness, in many cases exceeding 4 stone; it would be a great boon to horses if it could be made lighter.

Prizes were also offered for Two-, Three-, and Four-horse Whippetrees. Seven firms entered in Class 4, six in Class 5, and five in Class 6. The Judges awarded the Prizes as follows:—

Messrs. R. L. Knapp & Co., Messrs. Ransomes, Sims, & Jefferies, and Messrs. Vipan & Headley.

Prizes for Butter Packages were also offered. No award was made for a Package suitable for conveying Salt Butter to market; but for Packages suitable to convey Fresh Butter by Rail or Parcels Post, Messrs. Bradford won the First Prize of 5*l.*, and an extra Prize of 1*l.* was awarded to Messrs. Fawcett for a Parcels Post Package.

Among the Miscellaneous Implements, Messrs. Avery exhibited a very compact Weighbridge, suitable for commissariat purposes, and The Kirkstall Forge Company showed some Rolled Shafting suitable for barn machinery, and very much cheaper than turned; they also had on view a clever means of joining shafting of the same and different diameters.

I would here call attention to a vexatious cause of delay to the Judges, and of annoyance to the visitors, which seems almost to defy regulations, fines, and the whole armoury of written laws, namely, the continuance of *painting* after the stipulated time. I fear that if exhibitors do not more readily conform to the existing rules of the Society respecting this and some other matters, which they deem of small importance from their point of view, the Council will be compelled to make their regulations much more stringent.

I must not omit to mention a great feature in the Show-ground, the "Bungalows" erected for the first time, which contained rooms for the Council, the Members, and the Stewards, Judges, Engineer, Veterinary Surgeon, Reporters, and Police. They are much more convenient than the huts previously used, and reflect great credit on the designer, Mr. Bennison, the Society's Surveyor. The Council Rooms were used by H.R.H. the Prince of Wales, President-Elect of the Society, whose visits having extended over a large portion of two consecutive days, enabled him to inspect a considerable number of Stands in the Implement Yard, in addition to the Working Dairy. Fortunately the weather on those days was fine, though cold, and the Society benefited largely by the 40,000 half-crowns received at the turnstiles on the days of the Royal visit.

On Saturday and Monday, and at night, rain fell heavily, which prevented many paying their shillings, and turning parts of the Showyard where traffic was heaviest into a sea of mud, recalling to one's mind the Kilburn Show.

In resigning my Stewardship, I take this opportunity of thanking my brother Stewards, and also the Secretary, Mr. Jenkins, and his able Staff, for the valuable assistance I have at all times received from them.

XXXI.—*Report on Implements at Preston.* By CHARLES GAY
ROBERTS, of Collards, Haslemere.

Judges.

J. W. KIMBER, Fyfield Wick, Abingdon, Berks.

JOSEPH MARTIN, Highfield House, Littleport, Isle of Ely.

C. G. ROBERTS, Collards, Haslemere, Surrey.

THE number of Implement stands at Preston was less by seven than those at Shrewsbury last year, but the number of implements exhibited was slightly in excess. Although the duplicates that once swelled the number of entries are now banished, and the stands are arranged so as to bring similar implements as much as possible to the same part of the Yard, yet five miles of shedding, filled with more than five thousand articles, are too much for any one to examine thoroughly in a week. Every additional aid afforded them in the inspection of so vast a collection of machinery is doubly welcome; not only to the Judges of Miscellaneous Implements, but to that large class of visitors who wish in the limited time at their disposal to form some estimate of the progress revealed each year in agricultural mechanics. It was noticed last year that the words "New Implement" had been frequently appended by Exhibitors to the number of an entry in the Catalogue, when the article to which attention was thus specially directed had not the most remote claim to any such designation.

This year the following new clause was introduced in the General Regulations for Exhibitors:—

"In order to prevent the wrongful entry of exhibits as 'New Implement,' a fee of 1*l.* will be charged for every implement entered as a 'New Implement,' the fee to be returned if the Judges report to the Stewards that the implement is new, or such an improvement as in their opinion warrants the designation 'New Implement.'" The beneficial effect of this new regulation may to some extent be judged by the fact that the number of entries of New Implements was 319 at Shrewsbury

and 104 at Preston. Although the Judges shared with the studious visitor the advantage of having fewer peremptory calls on their attention, they found this benefit fully balanced by the extra work of considering the question of novelty in many an implement that they might otherwise have passed by more rapidly as not eligible for a medal.

Of these 104 entries, they reported to the Stewards that 13 ought not to have been designated New Implements, and that 10 others failed to put in an appearance. It is usually difficult to combine satisfactorily the duties of judging the Miscellaneous Implements with that of awarding prizes in special competitions; had there been no failure for want of entries in the competition for Harness, the Judges would have had great difficulty in getting through the work allotted to them. As a matter of detail, they suggest that it would be a convenience for other Judges if a list of "New Implements" were prepared of a size suitable for the commencement of a note book.

The new regulation as to the entry of New Implements has had the effect of making the Catalogue apparently a gauge of the progress of invention as applied to farm implements. It must not, however, be assumed to be an accurate gauge, for the Showyard contained many valuable and important improvements in well-known implements not made conspicuous in the Catalogue, and a few that were altogether new, though not so designated in the entry. On the other hand, when we consider the enormous increase in the number of patents that have been taken out in other departments of industry under the greatly increased facilities of the New Patent Act, it is clear that the long-continued agricultural depression has greatly hindered the progress we might otherwise have anticipated. An improvement in the demand must naturally precede an improvement in production; but a dull trade was the general report at Preston among the exhibitors, except those who dealt in dairy appliances, and a few of those who exhibited silos and silage machinery.

It is said of the Duke of Wellington, that amid all the anxieties of the Peninsular Campaign he found time to concentrate his thoughts upon such an apparently minor detail as the best shape and make of soldiers' boots. In a similar spirit the Council of our Society has, in a time of great agricultural anxiety, by offering prizes for harness, whippetrees, and packages for butter, directed attention to some of those smaller matters that will only be deemed unworthy of such notice by those who fail to realise how much attention to detail lies at the root of success; even genius itself has been defined as the art of taking infinite pains to arrive at perfection.

The following prizes were offered :—

HARNESS, GEARS AND WHIPPLETREES.					£
CLASS 1.—Set of Harness and Gears for a pair of horses for ploughing					5
CLASS 2.—Set of Harness and Gears for three horses for ploughing ..					5
CLASS 3.—Set of Harness for carting					5
CLASS 4.—Set of 2-horse Whippetrees					2
CLASS 5.—Set of 3-horse Whippetrees					2
CLASS 6.—Set of 4-horse Whippetrees					2
BUTTER-PACKAGES.					
CLASS 7.—Package suitable to convey Salt Butter to market ..					5
CLASS 8.—Package suitable to convey Fresh Butter by Parcels Post					
or Rail					5

SILVER MEDALS FOR NEW INVENTIONS.

There are ten Silver Medals, the award of which the Judges appointed by the Council have the power of recommending in cases of sufficient merit. These Medals cannot in any case be awarded to any implement, unless the principle of the implement, or of the improvement in it, be entirely new.

It was a disappointment and a surprise that out of the thousands of harness-makers in England, there was not one who attempted to win the first prize ever offered for harness by the Royal Agricultural Society. On other occasions the stimulus of a prize, even for an entirely new desideratum of agriculture, has seldom failed to produce competition, either at the first or second offer. There must be some special reason for failure this time. The fit of the collar is such an important point, that most farmers order their harness from a local maker; and though occasionally the man who goes to a new neighbourhood orders the chief part of his harness at the old shop, and gets the collars only supplied in the neighbourhood, yet few makers lay themselves out to supply farm-harness to customers at a distance. It may be that makers know so little of what others are doing in their own line, that each one has shrunk from incurring the expense of competing, among the multitude that he expected, for a prize of small pecuniary value. Whatever may be the true reason, it cannot be that such a competition is not desirable. Great differences are found in the weight and make of farm-harness in different districts; and as an instance of the want of definite knowledge of the subject, I may point to the curious fact, that while two leading agricultural authorities agree that farm-harness is often made unnecessarily and absurdly heavy, Mr. Morton tells us, in his 'Cyclopædia of Agriculture,' that Scotch harness is generally heavier than English; while Mr. Stephens, in his 'Book of the Farm,' when describing the plough harness of the Lothians, states that it is little more than feather-weight in comparison with English harness.

The horse-power on our farms enormously exceeds the sum of the steam and the hand-power employed upon them; if by improvements in harness we can add in any degree to the comfort and efficiency of our horses, we shall probably gain more in the aggregate than by all those recent and valuable improvements that increase the duty and efficiency of our steam engines. Our American cousins have taught us many an agricultural lesson; let us hope that some of them will exhibit their harness next year at Norwich, at the same time that other of their manufactures are shown on a large scale at the American Exhibition in London.

The doctor who finds his first treatment produces no effect, either repeats the dose or increases its potency. Our Council may perhaps be congratulated on having found a corner of the agricultural field that greatly needs an artificial stimulus. If the prizes are offered again, it may be well to send a notice of them to some of the leading makers in country towns. The writer enquired of makers of farm-harness at Walsall, and in Surrey, Hampshire, and Sussex, including the chief makers in Brighton and Hove, and found that not one of them knew that these prizes had been offered.

The Judges of Implements met the Stewards at 9 o'clock on Monday morning, and learned that of articles for competition there was not a single entry in any of the three classes for sets of harness; seven exhibitors had made twenty-three entries in Classes IV., V., and VI., for Whippetrees. There was only one exhibitor in Class VII. of packages for salt butter, and three exhibitors with several entries for packages suitable to convey fresh butter by Parcels Post or rail. After a short conference, it was decided that we should in the first instance inspect all the implements in the Yard that had been entered as new implements, and select those which could be tried in the field in conjunction with the whippetrees.

This inspection occupied us from 9 A.M. till 7 P.M. on Monday and Tuesday. Much time was spent in carefully examining the claims of novelty, and in giving a brief trial, where it was practicable, on the spot.

At the end of this inspection we selected the following implements to be sent for trial on the land secured for the purpose, viz.:—

No. 414. *Davey, Sleep and Co.'s* Single Furrow Turnwrest Plough.

No. 4131. *Hornsby and Co.'s* Two Furrow Digging Plough.

No. 1423. *Stanford and Buttons's* Revolving Harrow.

These three implements, requiring respectively two, three, and four horses to drive them, served for the trial of the three Classes of Whippetrees; but as we had most entries in the Two-horse Whippetree Class, and it was necessary to get a fair amount of

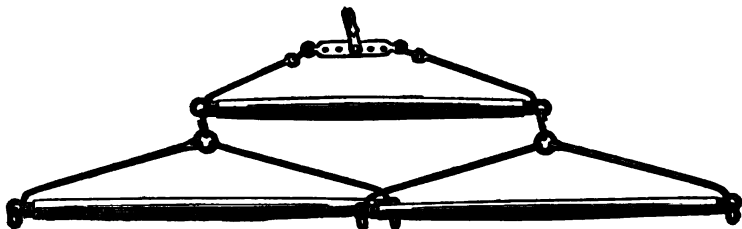
land ploughed up before we could work the revolving harrows, we borrowed another plough to aid in the trial; this was furnished by Mr. James Howard, who, with his usual prompt courtesy, lent us one of his Simplex ploughs, and ensured its being well driven by sending Hulatt, the veteran ploughman, who in old days often represented the firm in ploughing contests. It will be convenient to take the trial of whippetrees first, and leave the description of the other implements and of a draining plough, also tried in the field, till we speak of the Miscellaneous Implements later on in the Report.

The trials began on Wednesday morning on Mr. Dodgson's Farm at Penwortham, a village on the south bank of the Ribble, on the Liverpool road. The field was in clover lea, a deep hazle loam, in dry free-working condition. The horses were found by Mr. Dodgson, powerful teams, but too-well matched for our purpose. This was remedied by having out some other of his horses, and dividing the pairs till we got teams that pulled with sufficient irregularity to test the compensating powers of the different adjustments of the whippetrees.

In CLASS No. IV., *Sets for Two Horses*, the competitors invariably used the same material and principle of construction for the pomel-tree as for the whippetrees. Out of the nine entries, there were four of wood and iron, two of tubular iron, and three of steel.

Round bars of ash, tapering towards the ends and braced with iron rods, were employed by T. Corbett, No. 2437, and by L. R. Knapp and Co., Nos. 1660 and 1661. The engraving given of this very common form of whippetree is from Knapp's No. 1660; it is lighter by 8 lbs. than his 1661, and shorter than Corbett's by 10½ inches in the pomel-tree or main whippetree.

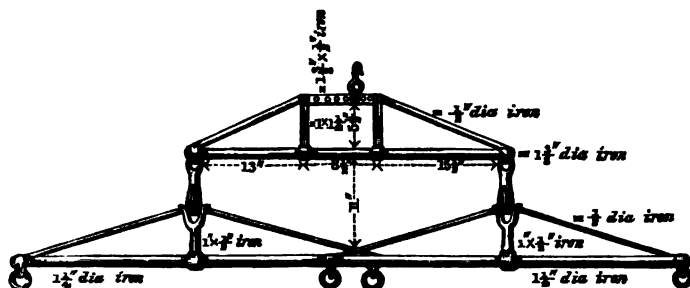
Fig. 1.—*Knapp's Whippetree*, No. 1660.



Ash bars of an oval section, with long iron links attached in an unusual way, were employed by Vipan and Headley; the same form is given in the description of their entry in Class VI. on p. 700.

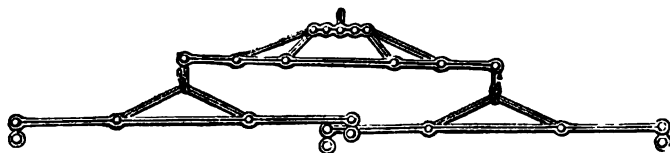
Tabular iron and iron rods were used by T. Corbett, No. 2436, and by Kell, Meats, and Co., No. 1366. There was no difference except in length between these two. It is the form of iron whippetree most commonly used. As might be expected, steel is the material that furnished the greatest variety in form; and from the great reduction in its price that has occurred within the last few years, we naturally anticipated that the most enterprising makers would make use of it.

Fig. 2.—Kell, Meats, and Co.'s Whippetree, No. 1366.



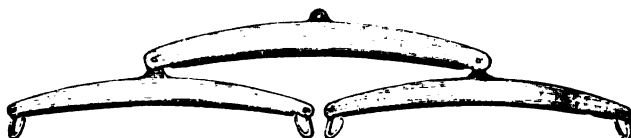
Two flat bars of a "figure of 8" section riveted together, and of the same size throughout, are used by W. Brenton, No. 246, both in the spreaders and the draught bars.

Fig. 3.—W. Brenton's Whippetree, No. 246.



Davey, Sleep, and Co.'s, No. 410, are made of steel, tapering from the centre and riveted in a light and strong channel

Fig. 4.—Davey, Sleep, and Co.'s Whippetree, No. 410.



section; the section assumes the shape of an elongated U, with its base towards the horse. Each whippetree is curved, to

1.	2.	3.	4.	5.	6.
CLASS.	Name of Exhibitor.	Catalogue Number.	Weight.	Width between effective Joint centres.	
				Of Whipple-trees.	Of Pommettes.
			qrs. lbs.	feet in.	feet in.
IV. For 2 horses.	Brenton, Wm.	246	1 0	3 4	2 10
	Corbett, Thos.	2436	1 9½	3 2	3 7
	Ditto.	2437	1 4½	..	..
	Davey, Sleep, & Co. ..	410	0 22½	2 11½	2 11½
	Kell, Meats, & Co. ..	1366	1 6¾	3 2¾	2 9½
	Knapp, L. R., & Co. ..	1660	0 17¾	3 2½	2 6½
	Ditto.	1661	0 25¾	3 3	2 6½
	Ransomes, Sims, & Jefferies	4339	1 6½	3 1½	{ 2 5½ to 3 7½ }
	Vipan & Headley ..	323	0 21½	2 10½	3 2
V. For 3 horses.	Brenton, Wm.	247	2 13¾	2 4	4 3
	Corbett, Thomas	2438	1 12½	..	4 5½
	Ditto.	2439	1 26½	3 2	5 1½
	Davey, Sleep, & Co. ..	411	2 1½	2 6	5 9
	Ditto.	413	2 2½	2 6	5 2½
	Kell, Meats, & Co. ..	1367	1 27¾	2 11¾	3 11½
	Ransomes, Sims, & Jefferies	1340	2 9	3 1½	3 11
	Vipan & Headley ..	324	1 15¾	2 7	4 3½
VI. For 4 horses.	Brenton, Wm.	248	3 14	2 4	6 2
	Corbett, Thomas	2440	1 21¾	..	3 3
	Ditto.	2441	2 25	3 2	3 7
	Davey, Sleep, & Co. ..	412	2 18½	2 6	5 9
	Ransomes, Sims, & Jefferies	4341	{ 2 12½ 1 3¾ chain }	3 1½	{ 2 5½ to 3 7½ }
	Vipan & Headley ..	325	{ 1 20 chain }	..	3 2

OR TRIAL at PRESTON.

7. 8. Distance longitudinally between effective Joint centres.		9. Price.	10
Of Whipple- trees.	Of Pomel- trees.		
inches.	inches.	£ s. d.	
4½	4½	0 18 0	{ Rolled steel, 2 flat bars figure of 8 section, riveted together.
6½	7½	0 17 6	Tubular iron, with iron rods.
..	..	0 18 6	Ash, with iron rods.
5½	5	0 18 6	Curved steel of channel section.
7½	8	0 17 0	Tubular iron, with iron rods.
10	5½	0 12 6	Ash, with iron rods.
8½	8½	0 14 6	Stouter ash, with iron rods.
-2½	..	0 17 6	Trussed steel, adjustable pomel-tree.
4½	4½	0 15 0	Ash of oval section and long iron links.
4½	6	1 10 0	Tubular iron spreader, with chains.
..	4½	1 5 0	{ Pomel-tree of ash, whippetrees and compensating bar of flat steel.
6½	5½	1 7 6	Pomel-tree of ash, whippetrees of flat steel.
3½	3½	1 10 6	Curved steel of channel section.
3½	3½	1 2 6	{ Curved steel pomel-tree, tubular chain, and partial pulley.
7½	8½	1 10 0	Four tubular iron and one double steel bar.
-2½	-2½	1 10 0	{ Trussed steel, with intermediate adjustable pomel-tree.
4	1	1 10 0	Ash, of oval section and long iron links.
4½	8½	2 10 0	Tubular iron with chains, four abreast.
..	5½	1 15 0	{ Ash pomel-tree, flat steel whippetrees, and com- pensating bars.
6½	7½	1 17 6	Tubular pomel-trees, flat steel whippetrees.
3½	7	2 15 0	Curved steel, channel section; four abreast.
-2½	..	2 0 0	{ Trussed steel, with central equalising chain and pulley.
..	5½	(2 0 0) (0 10 0) (hind traces)	{ Ash, of oval section, and long iron links, four pulleys.

allow the traces to be a little shortened. The trees are fitted with hooks turning upon a rivet, so that in work the point of the hook is well covered.

In these two forms of steel whippetrees great lightness is attained, with a considerable amount of strength in fair work ; but the Judges were of opinion that they were neither of them well suited to the rough work of a farm.

In *Ransomes, Sims, and Jefferies*, No. 4339, we have stout steel of a C-shaped section, well trussed.

Most of the other sets were adjustable by holes in the centre of the pomel-tree. Here the pomel-tree is lengthened, and has extra holes at each end ; as these ends are solid, they add somewhat to the weight ; but in addition to the advantages that the others have of giving a weaker horse less work than a stronger one, they also admit of the horses being set closer or wider apart, to suit the work.

The whippetrees were tried, as nearly as we could manage it, in alphabetical order, and the particulars of each entry are tabulated in the list on pp. 692 and 693. It soon appeared that some of the exhibitors had made their pomel-trees too long (see column 6). The point of attachment on the off-side of the pomel-tree ought to be just over the centre of the furrow ; instead of this, it was too far to the right, so that, in order to be directly in front of his work, the horse would have had to walk on the ploughed land. This was very noticeable in each of Corbett's entries, while Vipan and Headley showed the same defect in a smaller degree. In Davey, Sleep, and Co.'s set the two whippetrees frequently got locked together, the hook of one trace catching in the hollow back of the other tree. After the prizes had been awarded, they explained that in Cornwall they were accustomed to have rings instead of hooks on the traces, and that with rings there would be no catching in the same way. It was a great mistake that they made no change during the trial, but left the *hook* of the trace in the hook of the tree, thus causing their work to be most defective in the very point where they had taken special pains to avoid defect. With a horse that

Fig. 4a.—Details of Davey, Sleep, and Co.'s Whippetree.

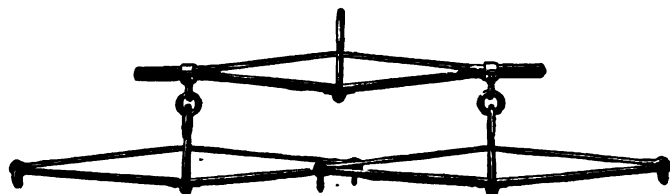


kicks, it is a great advantage to have no hook behind him that can cause injury. This would be attained when a ring on the trace is held by these safety-hooks. Though its merits were not

shown in the trial, I give details in Fig. 4a of the way in which the hook is secured in the tree; 4 is the hook at the end of the small whippetrees; 3 is a loose collar, or bush—bearing on which the hook works; 1 is the rivet which secures the whole together in the following order: the collar is put into the hole of the hook, and then placed between the sides of the whippetree, the rivet is then passed through holes in the tree, and through the collar. In this way the hook works freely, and the wear is taken by the collar instead of by the rivet. All the wearing parts of these whippetrees are secured in the same manner. It will be noticed (column 4) that these are the lightest set of trees but one in the class; they are novel in design, and compact in form.

Ransomes' trussed steel whippetrees differed in one respect from all the others. The eyes for the trace hooks being behind instead of in front of the point of attachment for the back-

Fig. 5.—Messrs. Ransomes, Sims, and Jefferies' Whippetrees, No. 4339.



draught in the centre, the tree is in a state of unstable equilibrium (column 7); consequently, with horses of equal strength, if one of them lags, it will require a greater effort on his part to pull up than for his fellow to keep in advance. The trees of all the other exhibitors are in stable equilibrium, and the nature of the adjustment tends to keep them level.

At the end of the trial we found Knapp and Co. the best representative for wood; Kell, Meats, and Co., for iron; and Ransomes' best for steel. On referring to our Consulting Engineer, Mr. Rich, we were assured that each of the three forms was amply strong enough for the work to be done. Although the steel set exhibited novelty and merit of design, and was very moderate in price for thoroughly good workmanship, it was yet the highest priced of the three.

The lightest of Knapp's entries being strong enough for the work, we saw no reason why the horses should carry nearly double the weight, or a farmer pay a considerably increased price for the sake of using iron or steel in place of the old-fashioned wooden trees. We therefore gave the prize in this class to Messrs. L. R. Knapp and Co., for their lighter set,

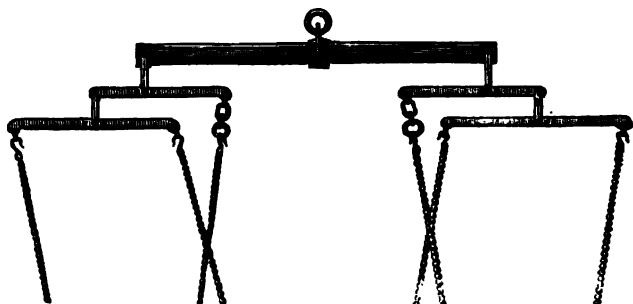
No. 1660. It was a matter of comment in the Showyard that these whippetrees were not entered in the Catalogue for competition. They had, however, been duly so entered by the exhibitors, and the omission of the words "for competition" was accidental.

In CLASS V., for *Three-horse Whippetrees*, Knapp and Co. did not compete. All the exhibitors arranged the horses abreast, except Ransomes, who placed them at first abreast, and in a second trial put two horses tandem-fashion in the furrow, and one on the land.

Brenton in this, and in Class VI., laid aside his rolled steel and employed tubular iron spreaders, strengthened in the centre by a short piece of extra tube shrunk on, with chains instead of rods. These trees proved to be too long for good work.

T. Corbett, in each of his entries in this class, had the pomel-tree of ash, and the whippetrees flat steel bars. In No. 2438,

Fig. 6.—*Mr. T. Corbett's Three-horse Whippetree*, No. 2438.

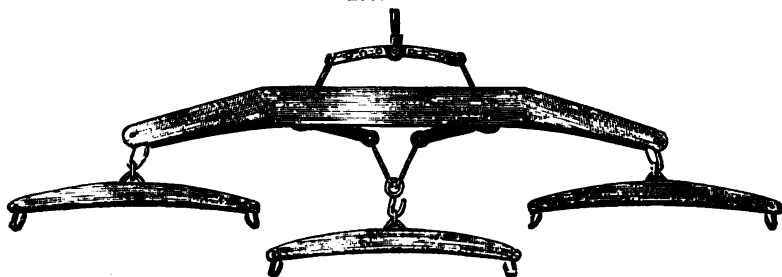


at each extremity of the pomel-tree, a compensating bar is attached by a link at one-third of its length. The long end of this lever carries the inner trace for each of the outside horses. To the short end of each lever a flat steel whippetree is linked. The outer ends of these whippetrees carry the outside trace of an outside horse, while their inner ends carry the trees for the horse that walks in the middle. It will be seen that in this very ingenious arrangement, and in their still more complicated one in Class VI., no horse has its two traces attached to the same whippetree, the consequence being that with every variation of draught each horse has one trace taut and the other one slack,—a fatal defect.

In their entry No. 2439 each horse drew from its own whippetree, but there was no attempt to equalise the draught of the middle horse, his tree being simply linked to the centre of the pomel-tree.

In *Davey, Sleep, and Co.'s*, No. 411, the outer bars draw from the ends of the pomel-tree, while the middle one is attached to a link connected at the ends of two equalising levers centred to the adjustable draught bar, and also to the pomel-tree. The length of this pomel-tree caused the attachment on the plough bridle to be too far to the left for the horse in the furrow, and the offside whippetree too far to the right.

Fig. 7.—*Messrs. Davey, Sleep, and Co.'s Three-horse Whippetree*, No. 411.



In No. 413 the pomel-tree is shorter, and instead of the levers a partial pulley of 2 to 1 is employed. The middle-horse tree is attached to the top chain, and the pomel-tree to the lower

Fig. 8.—*Pulley in Messrs. Davey, Sleep, and Co.'s Three-horse Whippetree*, No. 413.



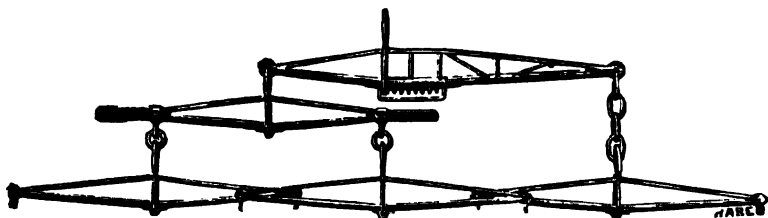
chain. The pulley in work stands on edge, and has a radius of 6 inches on the upper, and 3 inches on the lower half. The middle tree is thus higher than the others.

In *Kell, Meats, and Co.'s*, No. 1367, we have tubular iron trees arranged like Brenton's, four of them tubular, and the fifth (apparently without much reason for the difference) a double bar of steel. These trees would have given a better draught if they had been a little shorter.

Ransomes, No. 4340, was first worked three horses abreast, with five trees, four of them being the same as supplied for their two-horse set, and the fifth a strongly trussed, equalising and adjustable pomel-tree. Two of the minor trees were then laid aside, and the team was driven with one horse on the land, and two in the furrow. It will be noticed that the trees in the

three-horse set can be re-combined to serve for two-horse or for four-horse work, and thus reduce the farmer's outlay.

Fig. 9.—*Messrs. Ransomes, Sims, and Jefferies' Three-horse Whippetree, No. 4340.*



Vipan and Headley, No. 4131. Four trees are here arranged like Brenton's and Kell's; ash, with iron links, like those shown in Class VI. The equalising tree was curved, a form not generally to be recommended in wood, unless it is specially picked out, as this one was, with a natural curve in the grain.

The prize in this class was awarded to Messrs. Ransomes, Sims, and Jefferies, No. 4340.

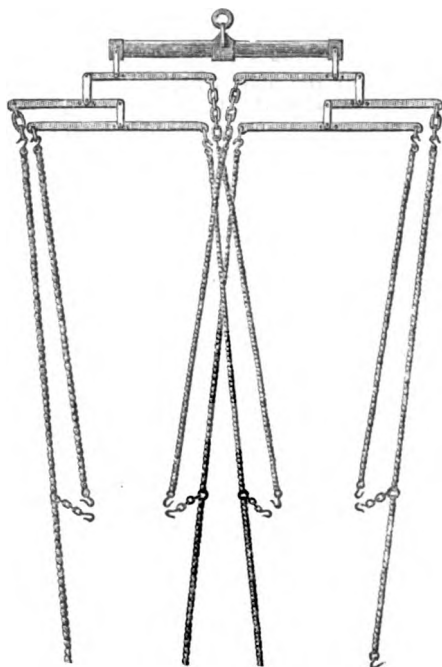
In CLASS VI., for *Four-horse Whippetrees*, two of the exhibitors drove their horses abreast, a mode of driving that cannot be adopted in ploughing, and that requires hardly any ingenuity in the arrangement of the whippetrees. We will take these two entries first. Wm. Brenton employed one long tubular iron tree, and attached to each end of it one of his sets of two-horse whippetrees, as used by him in Class IV. It will be noticed that this set of seven iron trees is among the heaviest in the class.

Davey, Sleep, & Co., No. 412, dispensed with intermediate pomel-trees, the whippetree for each horse being directly attached to the one long tree. These five trees were all of their hollow steel pattern; the long tree is very little longer than the tree they used in Class V. for three horses, consequently the minor trees overlapped one another considerably. This arrangement does not provide sufficiently for the equalisation of the draughts of the different horses.

Three competitors arranged their horses in double sets. In the first of Thos. Corbett's entries, No. 2440 (Fig. 10), it will be seen that we have first a stout ash pomel-tree, and at either end of it an ingenious arrangement of double compensating levers and trees of flat steel. An ordinary ploughman might easily get confused in trying to carry out the peculiar arrangement of these traces; it is a pity that the result of so much contrivance should be that each horse is subjected to a draught continually shifting from shoulder to shoulder, his traces being attached

to different whippetrees. In his second entry (No. 2441) Mr. Corbett employed two sets of the tubular iron trees exhibited by him as No. 2436 in Class IV., the pomel-tree of

Fig. 10.—Mr. T. Corbett's Four-horse Whippetree, No. 2440.



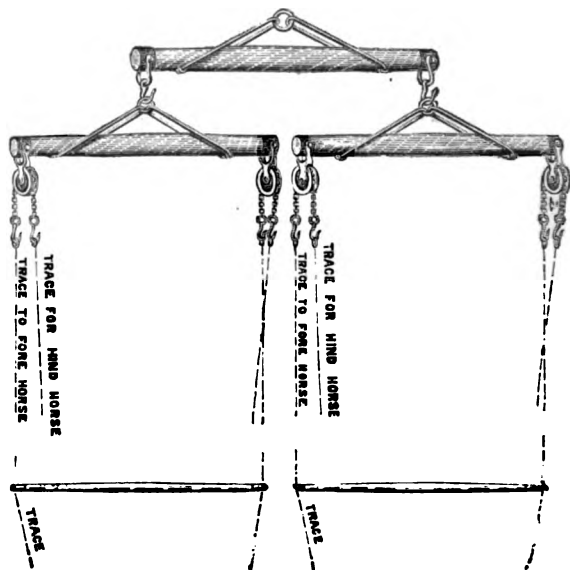
the leaders being attached by a long chain to the centre of the hinder pomel-tree. There is no equalisation of draught between the leaders and the hind pair in this arrangement; a still more serious objection is that, in turning on the headlands, great care is needed to prevent accidents from the long chain and the three trees hanging in front of the hind horses.

In *Ransomes, Sims, and Jefferies'* entry (No. 4340), they first used six trees in the same way as Corbett did in his second entry, but with the addition of a chain and pulley to equalise the draught. Here again the knees of the hind horses are in great peril in turning. Before their trial was ended they removed the chain and pulley and one set of trees, and finished their work by taking all the draught through the traces direct on to one set of whippetrees. The trees are probably strong enough to stand the strain under ordinary circumstances, but there is, of course, no equalisation of draught between the front

and hind horses. This equalisation was attained in a simple and satisfactory manner in the last entry in the class.

Vipan and Headley, No. 325 (Fig. 11). They entered with a pomel-tree and two whippetrees, similar to but stouter than those used in Class IV., the hooks on the whippetrees being replaced by small pulleys with short chains, and the traces from the front and the hind horse being attached to the two ends of this chain, the draught was equalised without the weight and dangerous obstruction of any whippetrees dangling between the horses. The chains of the front horses are carried by short

Fig. 11.—*Messrs. Vipan and Headley's Four-horse Whippetree*, No. 325.



chains from the saddles of the rear horses. We gave Messrs. Vipan & Headley the prize in this class for their general arrangement, but do not specially commend the construction of their individual trees.

The Judges would have liked to subject all the whippetrees to a thorough mechanical test; and at first it was hoped that the appliances obtainable in the Showyard would be sufficient to test them to the breaking strain, but after a careful examination, Messrs. Rich and Courtney, our assistant-engineers, reported that this could not be done satisfactorily on the spot. The information already obtained was sufficient to guide us in

the allotment of the prizes, and as most of the exhibitors were anxious to have their whippetrees returned to their stands for exhibition, we felt hardly justified in retaining them after the prizes were adjudged. The excellent rule that prohibits the entry of duplicates by any exhibitor might probably be relaxed in the case of articles entered "for competition." Visitors naturally expect to find such implements at the stands of the exhibitors as soon as the Yard is open to the public, and the makers suffer if they cannot show them; at the same time it is often desirable that such implements should remain in the hands of the Judges or the engineers after the prizes are awarded, in order that further investigations may be made that may result in obtaining information of general principles of great public value. If our engineers had been able to take all the whippetrees to London, and there test them to destruction, we should probably have settled the interesting question of the comparative merits of wood, iron, and steel for the various parts of whippetrees. In the absence of this definite information, I offer, with much diffidence, a few non-professional observations.

Whippetrees and pomel-trees should of course be constructed to meet the strain to which they are subjected, and the nature of this strain is determined by the points of attachment. The fore draught is taken from the extremities; the hind draught is taken sometimes from the extremities, as in Figs. 1 and 2, and sometimes from the centre, as in Figs. 3, 5, and 6. In the first case, the strain is one of compression, as when a man leans his weight upon a walking-stick; in the second, it is a transverse strain, as when a man holding the two ends of a stick tries to break it across his knee; while in Fig. 11, the transverse strain corresponds to the effect of bending the stick across two knees. Ash and tubular iron were the only substances subjected to the strain of compression. *Solid* wrought iron subjected to such a strain has little more than three times the strength, though it is eleven times the weight of ash. Even when used in a tubular form its greater weight and cost are hardly counterbalanced by its greater durability.

When subject to a transverse strain, solid wrought iron of similar section is four times as strong, while eleven times as heavy as ash. In Mr. Corbett's entries, in Classes V. and VII. (see Fig. 6), we find ash and solid rolled steel subject to transverse strain in the same set of whippetrees; and it is a very curious fact that while rolled steel is used for the minor strains, the main pomel-tree is shaped of ash in the old and simple fashion adopted by many farmers who have their whippetrees made at home by the village carpenter. Singularly enough,

Mr. Corbett's 3-horse set, No. 2438, illustrated in Fig. 6, was accidentally subjected to a trial of great severity. In crossing the site of an old ditch that had been filled in, the share of the digging plough to which it was attached struck upon the buried root of a large tree; the ploughshare was broken, and the whippetree was crippled at the same time. The ash pomel-tree that took the draught of all three horses was uninjured, but one of the steel whippetrees was so bent and twisted that it could not be used again without sending it to the smithy. We could wish for no clearer demonstration of the truth that neither steel nor iron should be used in a solid form for whippetrees. It may be noticed that Mr. Corbett is not altogether singular in his preference of wood for the greatest transverse strain. On the first stand in the Yard, Messrs. J. L. Larkworthy and Co. exhibited three sets of whippetrees, but did not enter them for competition. Two sets for two horses were each of steel, but in the three-horse set the pomel-tree was of wood, and the minor trees of iron. Lest any one should attach too much importance to this adherence to old custom, forgetting that the old proverb *experientia docet* may sometimes be fairly rendered "experience does it," it may be well to mention that, a few stands further on, a set of whippetrees was shown with ash-bars of *oval* section subjected to a strain of compression only, the oval form being of course right when subject to a transverse strain, but as senseless for a mere strain of compression as it would be in a walking-stick.

It is much to be regretted that I cannot give the exact strength of the well-trussed steel whippetrees, and compare them in weight and strength with old-fashioned wooden ones; but there is no doubt whatever that the set that obtained the prize in Class VI. is amply strong enough to take a full four-horse strain. The question may here be raised, however, Is it absolutely necessary to make whippetrees so strong, that when an accident occurs in the field they shall be able to suddenly pull up the horses without injury to the trees? That is, are we to reckon the 4-horse strain as the force exerted in steady work, or in the sudden jerk that stops them? In most engineering work it is not left to chance to determine the part that shall give way whenever the strain exceeds the power. If every part of the harness and of the implement is made of greater strength than the horses, we save our tackle at the expense of our livestock. It would be better policy to choose some point or points (the hooks or the traces, for instance) that shall break with a strain more than a horse should be subject to. A safety-valve of this sort would often be of use when valuable animals are attached to valuable implements. If no such provision is made,

it may be better to break a whippetree than to injure a good horse.

Two prizes of 5*l.* each were offered for Butter Packages. In Class VII., "Package suitable to convey Salt Butter to market," the only competitors were Messrs. T. Bradford and Co., who sent a series of cubical boxes, very strong and iron-bound; inside the outer box are six loose squares of American maple, fluted on the inside. The cube of butter is surrounded by these loose boards, and then placed in the outer box, which can be fastened either by a peg or a padlock. The prices of these boxes are 8*s.* to hold 28 lbs., 10*s.* to hold 56 lbs., 12*s.* to hold 84 lbs., and 14*s.* to hold 112 lbs. The boxes are well made and very strong, and are not dear at the price; but the Judges consider that an ordinary butter-firkin, at a very small fraction of this price, is much more likely to meet the wants of the few English farmers who send salt butter to market. A medal was awarded at the Kilburn Meeting to Messrs. A. Ransome and Co., of Stanley Works, Chelsea, for machinery that makes butter-firkins of better finish and at lower prices than they can be made by hand labour.

It is to the farmer's interest to supply the home market with fresh rather than with salt butter, and in many places it is usual to pot down the surplus summer butter and make it up again in the autumn and winter for sale as fresh butter. For those who may wish to compete in the Indian or other markets against Irish and foreign salt butters, a cheap firkin will be much better than any expensive box; the return of empty packages being only practicable for comparatively short distances.

From these considerations, the Judges recommended that no prize should be given in Class VII.

In Class VIII. they found it would be difficult to compare together the small light packages required for Parcels Post and the larger and heavier packages suitable for sending by rail; they therefore obtained permission from the Stewards to separate the two kinds of boxes, and award an extra prize of 1*l.* for packages suitable for Parcels Post.

Thomas Bradford and Co. entered a series of strongly made boxes for both purposes. The smaller ones we considered too heavy and expensive for Parcels Post; but we found the larger size admirably adapted for sending butter by rail, and we awarded them the prize of 5*l.* The front of the box opens as a door, and shows a number of removable shelves, with sufficient space between them for a row of 2-lb. rolls of butter; each roll is kept in its place by slips of wood on the surface of the shelf. The boxes can be fastened by peg or padlock. The sliding

shelves are made with the grain running from groove to groove ; when wood is damped it swells across and not in the direction of the grain, hence these shelves are not liable to stick in the grooves. The shelves and boxes are all neatly made of American maple, a wood of greyish-white colour, of a very fine grain with a smooth surface, to which butter does not adhere as it does to most kinds of wood.

The Dairy Supply Company entered for Parcels Post a rectangular outer case of wood with an inner cylindrical case of tin, together weighing 13 oz., price 7½d., to hold 2 lbs. of butter ; it is intended that grass or moss should be packed between the cases to keep the butter cool.

The same Company entered for carriage by rail a deal box fitted with three trays, each tray to hold 10 lbs. of butter in pound or half-pound pats. Each tray has countersunk holes in it to receive the pats, and two side pieces for lifting.

Thomas Fawcett and Co. entered for carriage by rail a box of pine, with metal corner-plates, stained and varnished outside, with four movable shelves. This box, when opened, smelt strongly of pine-resin, and would have flavoured any butter packed in it. The lid was intended to slide, but being cut the wrong way of the grain, it was difficult to move. For carriage by Parcels Post this firm exhibited, and obtained the prize of 1l. for, some of Bethell's "Unique Folding Boxes." These are made of strong leather board, hinged with a double lining of brown linen ; attached to the body of the box is an adhesive cloth label, which is passed through a slit in the lid when closing, and affords special security for travelling. When not in use, the box folds quite flat, and is not likely to get broken.

Fig. 13.—Box folded.

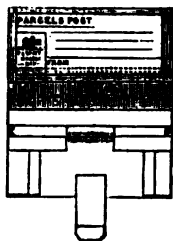


Fig. 12.—Box complete, ready for forwarding.



One dozen boxes, when folded, only occupy a depth of three inches. The largest-size box will take 6 lbs. of butter, and will then weigh less than 7 lbs. gross ; it costs 4s. 6d. per dozen.

Before putting it in the box, the butter should be folded in a sheet of grease-proof butter-paper, which a local grocer or stationer will supply in moderate quantity at 1s. per lb.

On the last day of the Show a pound of butter from the Working Dairy was sent in one of the smaller boxes to each of the Judges' homes. The butter was fresh-churned and soft, but it travelled well; in two instances the box was a little grease-marked; probably this would not have happened if the sheet of grease-proof paper had been larger.

Silver Medals were awarded to the following new implements:—

No. in Catalogue.

2402.—Messrs. W. Rainforth and Sons, for Patent Flat Adjustable Screen for Corn.

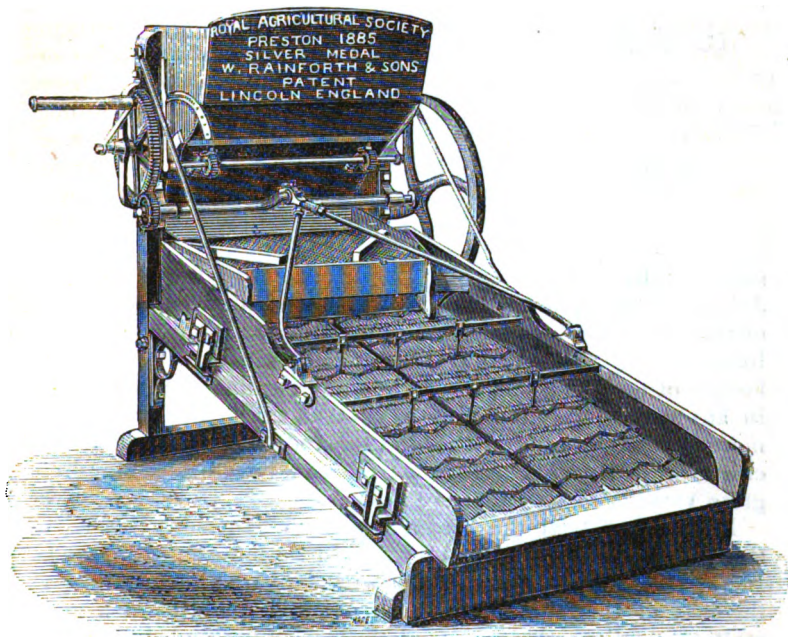
3959.—Messrs. Hathorn, Davey, and Co., for Domestic Motor or Safety Engine.

4130.—Messrs. Richard Hornsby and Sons, for Patent Plough for taking off the top Spit for Draining.

4590.—Mr. Robert Maynard, for Patent Automatic Feeder attached to Chaff Cutter.

There are several forms of rotary cylindrical corn screens that can be readily adjusted for the separation of different kinds of

Fig. 14.—*Messrs. Rainforth and Sons' Flat Adjustable Corn Screen, No. 2402.*



grain, and are self-cleaning in their action. A flat screen possessing the same advantages, has been for some years

wanted, and has now been invented by *Messrs. Rainforth and Sons*. The longitudinal bar that runs down the centre of the screen is fixed upon the frame; the parallel rods with the bars that form the sides of the screen can be drawn towards the centre bar to make the meshes fine, or spread from it to make them coarse, by the working of a lever fitted on the underneath side of the top of the screen, and not shown in the drawing. The bars and rods are kept parallel with each other by the links that are seen traversing the face of the screen. There are six holes in each rod, and corresponding holes in the links above it; studs are passed loosely through these holes; a shoulder on the stud keeps the link raised a little above the rods of the screen. These rivets and shoulders are shown at the top of Fig. 15; they are introduced in order to keep the links clear of a series of washers that run between the bars and keep the entire length of the screening-surface clean. These washers are strung on rods fixed transversely on to the fixed bed under the oscillating screen. In Figs. 15 and 16, kindly

Figs. 15 and 16.—*Details of Messrs. Rainforth and Sons' Corn-screen.*

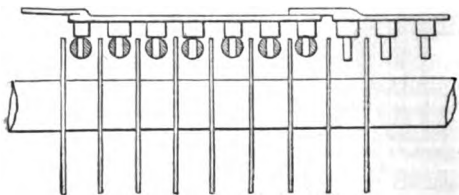


Fig. 15.

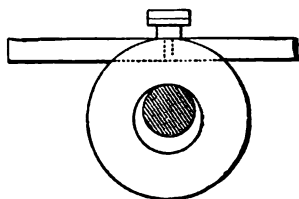


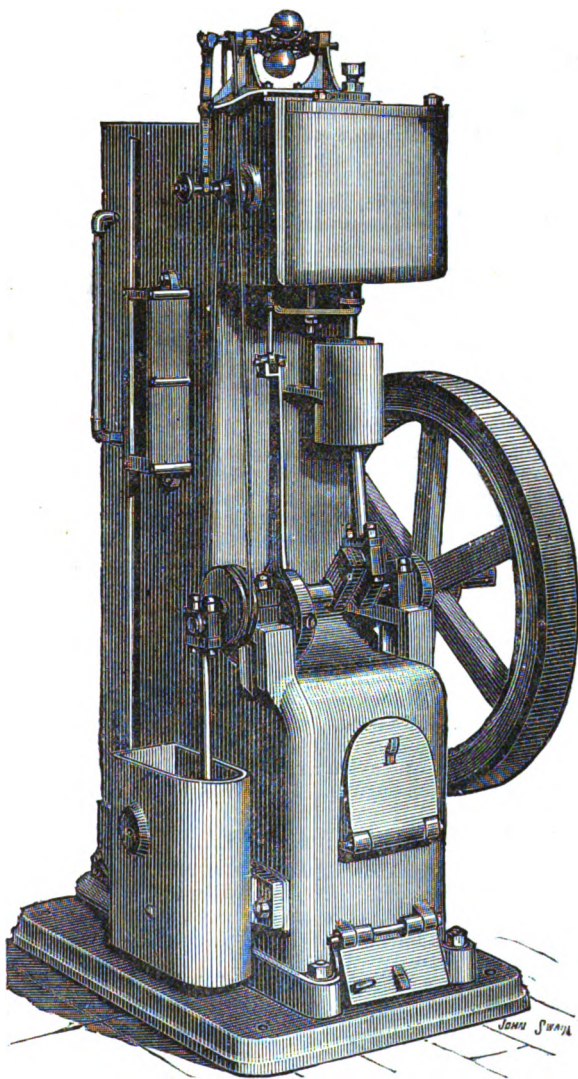
Fig. 16.

supplied by the editor of 'Engineering,' in whose issue of July 24 a description of the screen appeared, the relative position of these washers between the screen rods with the connecting links passing over them is shown in detail, it being a special feature of merit in this screen that corn cannot remain lodged in any part of it. It will be seen that, as the links assume a more or less oblique position, so the rods of the screen are set closer or wider apart. The screen can be adjusted to dress grain varying in size from rye to beans.

In our first trial the screen was set close, and a bushel of thin grinding barley was run through in 1 minute and 10 seconds. It was then set wider, and tested with corn obtained by mixing the best of this thin barley with a larger quantity of a good malting quality. In each trial the barley descended in a thin and even stream; the rippling action caused by the grain passing over the connecting links changed the position of each

grain six times in its passage, and the separation was thoroughly satisfactory in each trial.

Fig. 17.—View of Messrs. Hathorn, Davey, and Co.'s Domestic Motor, No. 3959.



I am indebted to Mr. W. E. Rich for the following report on No. 3959, Messrs. Hathorn, Davey, & Co.'s Domestic Motor or Safety Engine, shown in elevation in Fig. 17. It differs from

the engine illustrated in section on pp. 34 and 35 of the last number of this 'Journal' in being a surface condenser, while the other was an injecting condenser.

"The Davey Motor which attracted much attention at the Shrewsbury Show last year, and was described in the Implement Report ('Journal,' No. XII.), was this year tried upon the brake, and in recognition of its novel features and performances was awarded a silver medal.

"The engine tested (Catalogue No. 3959) was nominally 2-horse power, with cast-iron boiler, as in the Motor described on pp. 33 to 35.

"The fuel used was ordinary gas-coke, and the cold water used for condensing was wasted. A simple wood brake was applied on the edge of the fly-wheel, and after accurate balancing was loaded with a known weight acting at the periphery of a circle 18.33 feet circumference. With 3 lbs. of wood, and 24½ lbs. of gas-coke, the whole apparatus was warmed up and steam raised to atmospheric pressure (or, in other words, the water just began to boil under the ordinary pressure of the atmosphere), in 1 hour 3 minutes. The engine was then pulled round and started, and ran for the first 20 minutes at 100 to 110 revolutions, with a load of 16.2 pounds on the brake, corresponding to .95 horse-power, at 105 revolutions per minute. As it was apparent that the engine was then over-loaded, and in consequence unable to get up to its proper speed, the load was then reduced to 14.2 lbs. on the brake, and the engine then ran for 4 hours at an average speed of 198 revolutions per minute, corresponding to 1.56 horse-power. Thus the mean power on the brake during 4½ hours was 1.51 horse-power. The estimated nett consumption of coke during the same time was 45.5 lbs. For the purposes of the trial it was thought best to eliminate the first 20 minutes, and to estimate that the coke consumption was uniform, so that during the last 4 hours 42 lbs. was the nett consumption, or 10.5 lbs. per hour, which, at 1.56 horse-power, gives 6.7 lbs. of coke per brake horse-power per hour.

"The consumption of condensing water was tested several times during the trial, and was found to average 4.05 gallons per minute, or 156 gallons per horse-power per hour; the average rise of temperature being 38.5 degrees Fahrenheit, from 62½° to 101°, and the vacuum averaged 23½ inches. For a short time, as an experiment, the condensing water was reduced to 109 gallons per horse-power per hour, with a rise of temperature of from 61° or 62° to 123°, but the engine would not work well with so little water, and the vacuum fell to 22½". The results recorded should be treated as approximations, as for several reasons it was not practicable to conduct the trial with the same precautions and precision as have been observed in the most recent competitive trials of steam-engines. In abstract the results are as follows:—

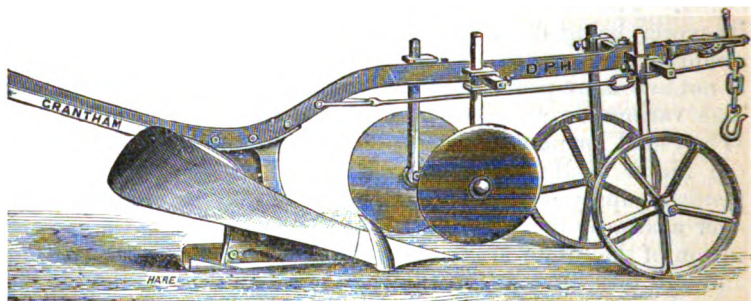
Engine	2 horse-power nominal.
Time occupied in raising steam	1 hour 3 minutes.
Fuel consumed in raising steam	3 lbs. of wood and 24½ lbs. of coke.
Duration of official trial	4 hours.
Average speed in revolutions per minute	198.
Average horse-power on brake	1.56.
Average weight of gas-coke consumed per brake horse-power per hour	6.7 lbs.
Average steam pressure	Rather below atmosphere.
Average vacuum	23½ inches.
Average temperature of injection	62.5°.
" " " hot well	101°.
Average rise in temperature of condensing water	38.5°.
Average rise in hot well water discharged per horse-power per hour	156."

This engine possesses the great merits, for agricultural use, of simplicity and safety. As evidence of this it may be mentioned that the engine used to drive the Separators in the Working Dairy was tended by a plumber who had never driven an engine before. It would not often be advisable to entrust an ordinary steam-engine to the tender mercies of an average dairy-maid, but with this engine there is no more chance of explosion than there is with an unclosed kitchen boiler. The Motor is a vacuum engine of simple construction, its power being derived from the condensation of steam at the atmospheric pressure. It has a small generator, in which there is not any more pressure than there is in an ordinary tea-kettle. The vacuum is produced by means of a supply of cold water. When used for pumping purposes, that supply is obtained from the Motor itself; but when not used for pumping, an independent supply is necessary. The water may be used over and over again, by the use of a tank. The working cylinder and piston of the Motor are made of bronze, require no lubrication, and will take no harm if allowed to remain idle without attention for a great length of time. No renewable parts are required, and the only packing necessary is a little tallowed hemp around the piston and valve rods. No special oil is required for the bearings; ordinary machinery or olive oil will do equally well. The fire should be made of coke, if it can be obtained, as it makes no smoke, and does not cause the chimney to require sweeping. When using coke, the fire-box should be kept nearly full of fuel, and the damper regulated; in this way the Motor will run a very long time without any addition of fuel. In working the Motor no attention is required to anything but the fire, and that only very occasionally. When the quantity of water required for condensation cannot be easily obtained, a condensing tank is necessary. This will furnish an ample supply of hot water for all dairy purposes, and will be still more convenient in laundry work.

No. 4130. *Messrs. R. Hornsby and Sons'* Plough for taking off the top spit for draining. The construction of this plough (with the stilts omitted) is shown in Fig. 18. The two adjustable skeiths or disc-coulters cut the two sides of the furrow, and the cut is completed by the share with a knife rising from its near side. The furrow thus clearly cut is lifted and laid unbroken by the side of the drains. The plough was taken to the trial-field at Penwortham, and was first set to cut a furrow 10 inches wide and 7 inches deep. It afterwards cut a furrow 11 by 8. In spite of a previous watering, the friable nature of the ground prevented the furrow being as sharply cut as it would have been in a clay soil; but the work done satisfied the Judges of

the efficiency and value of the implement. In addition to its use in lessening the cost of pipe-draining, it will probably be found of much service for surface-draining in low-lying grass-land with no outfall for under-draining. Our very energetic and courteous Steward of Implements, Sir John Thorold, has kindly furnished me, while writing this Report, with his per-

Fig. 18.—*Messrs. Hornsby and Sons' Draining Plough, No. 4131.*



sonal experience of the economic value of this plough. It was employed last April to assist in draining pasture-land with pipes 27 inches deep on his estate at Syston Park, near Grantham.

FURROW DRAINAGE WITH USE OF PLOUGH.

		Chains.		£	s.	d.
Wilson's Brook Close	..	260·20	at 9d. per chain	9	15	2
" " "	..	189·50	" 10d. "	7	17	11
Atkin's field	..	456·50	" 10d. "	19	0	5
906·20						
Actual cash payment			..	£36	13	6
Wilson's field	..	4	horses 2 days ploughing,			
Atkin's	..	4	" 2 " "			
4 horses for 4 days = 16			at 5s.	4	0	0
Total cost			..	£40	13	6
The cost of this work, if done by manual labour only,						
906·20 chains at 1s. 8d. per chain			..	75	10	4
Difference in favour of use of plough			..	£34	16	10

The plough threw out 9 inches, and the men dug 18 inches. The above prices include laying the pipes and filling in the drain. The mains were done by manual labour in each case. The usual prices paid for furrow-drains are 1s. 10d. a chain for 30 inches deep, and 1s. 8d. for 27 inches. At first starting the

men complained that the top of the drain was narrower when thrown out by the plough; but accurate measurement proved that it was actually a little wider than when dug by hand.

The land was a good clay with a level surface, but dotted over with tussocks of grass (*Aira cæspitosa*). It was thought likely that these would prove troublesome, but the disc coulters of the plough cut through them without difficulty. No difficulty was experienced in replacing the top furrow, and after a heavy roller had passed over it, the surface of the drain was very little raised above the level of the field.

No. 4590. *Mr. R. Maynard's* Automatic Feeder to Chaff-cutter. Fig. 19 (p. 712) shows the Self-feeding Chaff-cutter attached to a threshing-machine, and taking straw from the shakers. The self-feeding apparatus is seen at the upper part of the centre of the block. A belt from the main spindle of the chaff-cutter passing over the pulley facing us, drives a crank; this crank actuates two separate parts of the apparatus: it gives motion to the rake that is half buried in the straw in this figure, and is shown lifted up in Fig. 20 (p. 712). This rake is raised and thrust forward, then plunged into the straw and drawn back as it would be by a man raking straw towards him. In this way the straw is automatically taken from the shakers to the feed-box of the cutter. The same crank also raises and depresses the arms seen in Figure 19, on the left of the pulley and above it. Brackets and cross-bars fastened to these arms form a presser that presses the feed on to an endless chain, working over rollers, and carries it forward to the feed-rollers, that in their turn pass it on to the cutting-plate.

The patentee has so arranged the parts of this new apparatus that they can be added to any of his chaff-cutters at a cost of 15*l*. For convenience in travelling it is advisable to mount the machine on four wheels instead of two; these four wheels, with carriage and shafts extra, cost 4*l*. 10*s*. This invention will enable any one who practises cutting from the shakers of a threshing-machine to dispense altogether with the man who has hitherto occupied the dusty and dangerous post of feeding the cutter. Such work costs at least 3*s*. a-day; if used only 13 days in the year, the saving in wages will be equal to 10 per cent. on the outlay of 19*l*. 10*s*. In the purchase of a new chaff-cutting machine the extra cost of the automatic feed, with the four wheels and shafts complete, is 13*l*. When threshing and chaff-cutting go on at the same time, the whole process can now be done without the interruptions that necessarily occurred when one link of the process depended upon the exertions of a man working in danger and great discomfort.

The Automatic-feed Chaff-cutter was shown at work taking

Figs. 19 and 20.—Views of Mr. Maynard's Chaff-cutter attached to a Threshing-machine.

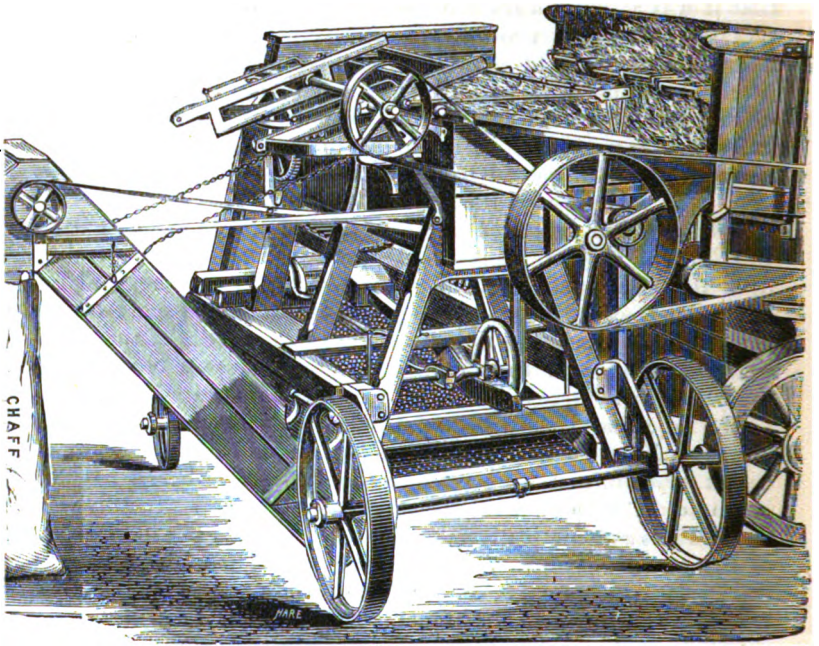


Fig. 19.

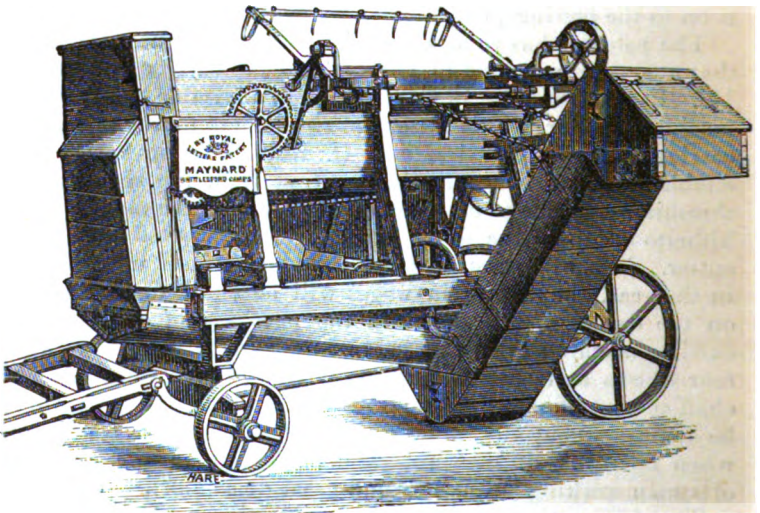


Fig. 20.

straw from the yealming machine that obtained a Silver Medal at the York Meeting in 1883. It did this work very well ; but as a further trial the Judges had the yealmer removed. Straw, that had been well shaken up to bring it into a rough state, was then pitched up to a man standing on the platform, and he passed it on to the feeder, which then helped itself to as much as was required to keep the feed-box full; the supply to the feed-rollers was more even than it usually is when the work is done by hand.

In their Report to the General Meeting last December, it was stated "that on the recommendation of their Education Committee, the Council have decided to apply a portion of the Educational Grant to the practical testing of the skill of Dairy-workers by an Examiner to be appointed by the Council." The examination in dairy-work was carried out in the Working Dairy at Preston. As in many other first examinations held by the Society, the competitors were few. For certificates of proficiency in Cheese-making, no dairy-women, and only two young dairy-men, competed. Mr. Irvin and Mr. Stevenson are both from Canada. One left the curd to ripen naturally; the other artificially acidified it. The curd was ground, salted, and vatted; and was turned and re-clothed, and put under pressure on Monday and Tuesday. Mrs. Nuttall and Mrs. Gibbons, the Examiners in this department, sent in the following report:—

EXAMINATION IN CHEESE-MAKING.

Working Dairy, July 14, 1885.

SIR,—We much regret that there has not been a larger entry of candidates for Certificates of proficiency in Cheese-making, as we are of opinion that much educational good will ultimately result to the Dairy industry from this source, especially if each branch of Cheese-making were represented, and we feel sure that another year, from many remarks made to us, the competition will be much increased. In discharging the duties of making the awards, to the only two candidates who came before us, we deemed it necessary to have Cheese made in the Dairy; and as the system adopted by each is on the improved American principle, we are not able for the present to arrive at a satisfactory conclusion, neither shall we until such time as the Cheese is properly matured. We have therefore taken it to our own dairy to carefully store, and shall there watch it during the period of its maturing; and at the proper time, after having examined it when fully ripe, shall be glad to send in a detailed report to the Council.

We are, Sir, yours respectfully,

LOUISA NUTTALL.
ELLEN GIBBONS.

H. M. JENKINS, Esq.

Miss Smithard and Mrs. Travis were the examiners in the competition for butter-making.

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There were only five competitors. They were allowed severally to choose their own churns and the quantity of cream they required, and the following notes were taken during the trial :—

Miss MARY HIRD WARD. Churned 10 quarts cream : produced 8 lbs. butter. Butter came in 35 minutes. Carefully tested her cream before commencing, but gathered it a little too much before washing ; was careful in not touching her butter with anything but wooden articles. Used Diaphragm Churn (Bradford's).

WALTER THOMAS TOMLINSON (only 15 years of age). Churned 16 quarts cream, produced 13 lbs. butter. Butter a long time coming, a little over one hour and a quarter ; still the butter was very nice. Was very careful in making up, and very quick in his movements. Used Diaphragm Churn.

WILLIAM HENRY KNIGHT. Churned 10 quarts cream, produced 7½ lbs. butter. Butter came in three-quarters of an hour in very good form, but was made up badly. Tested his cream before churning. Cotswing Churn.

Miss HAILWOOD. Churned 16 quarts cream, produced 13½ lbs. butter. Butter came in one hour in good condition, but worked it a little too much ; rather greasy. Used Cotswing Churn.

Miss M. E. SANDHAM. Churned 24 quarts cream, produced 18 lbs. butter. Salted her cream, did not test it. Butter came in 35 minutes. Made it up very badly by hand, which was not at all prepared, consequently, instead of butter, there was nothing but lumps of grease. Used Hathaway's Barrel Churn.

After carefully watching the competitors at work, and taking notes of their ways and means of producing butter in the Dairy on Monday last, we have decided that the following are entitled to the prizes, viz. :—

Mary Hird Ward. First.

Walter Thomas Tomlinson. Second.

William Henry Knight. Third.

Miss Hailwood's butter was very good, but not quite good enough for a prize ; still we commend her.

MARIAN SMITHARD.
B. TRAVIS.

Miss Ward is to be much congratulated on her success ; had she failed, the Society for the Employment of Women might have heard of it, and next year there would have been a cry of "Dairy-maids to the rescue," to save the credit of the sex in a department of industry which is exclusively their own in popular esteem. Miss Smithard, who superintends the Working Dairy, has set a good example of enterprise to other dairy-maids, by exhibiting in use an excellent butter-cooler of her own invention.

The Marian Refrigerating Box for hardening butter is designed for use in dairies where ice cannot be obtained. It is a deal box, kept cool by a very small stream of running water, brought by a pipe from any convenient tank ; and regulated by a tap. Resting on the top of the box is a rather deep tray of zinc. This first receives the water ; a tap in this tray lets a small stream of water into a spreader, whence the water descends

in a very thin stream down the outside of the back of the box, falling into a second shallow zinc tray placed immediately under the box. At the further end of this tray it is discharged through a waste pipe. Cold air from the surface of this water enters the box through a series of holes drilled in its bottom, and circulates round the sides of the board or dish that holds the butter, raised above the bottom by slats of wood. The door of the box is in the front, opposite to the side that is kept wet. Butter should always be thoroughly cooled *before* it is made up; this is a convenient arrangement for the purpose. When the butter is so hard that pieces of it can be broken short off, it is ready for the final working.

The Working Dairy itself has now been so frequently described in the 'Journal,' that it is not necessary to say more about it here, except that it fully retained its popularity. A smaller size of Danish Separator than those previously exhibited was shown at Preston. It is intended for dairies of from 30 to 40 cows, and can be well worked by a pony; its price is 27*l*. All the power required in the Dairy was supplied by one of Davey's Domestic Motors of 4-horse power, and the water heated in the condensing tank satisfied all the requirements of the Dairy for washing purposes.

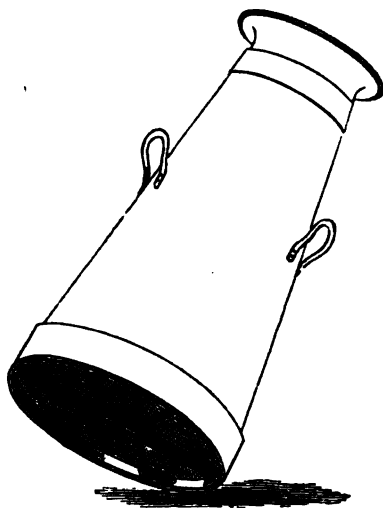
Among dairy appliances in the Showyard, one that seems likely to prove very serviceable was exhibited by *Mr. J. Gray, of Stranraer, Wigtonshire*. His Patent Leverless Cheese-Press (No. 3818) is fitted with steel screws, with a nut three inches deep. It is compact in shape, occupying much less dairy space than the old lever presses. Pressure is made continuous through the night by the introduction of a powerful spiral spring tested up to 2½ tons pressure. An indicator in front of the spring enables the pressure to be put on with accuracy to the amount required, and shows the exact amount of effective pressure at any subsequent time. At the expiration of the field trials of implements, the Judges had no opportunity of giving this press a satisfactory trial. They were, however, favourably impressed by its merits, and fully concurred in the hope expressed by their Stewards that a trial might be given to it next year. Another new implement exhibited by Mr. Gray was an improved Curd Mill (No. 3819), in which the curd is cut into strips by a block pressing it through a knife-frame fitted with sharp knives, crossed in the American fashion. The pressure being evenly distributed, and the divisions uniform, the whole strength remains in the curd, and it is not hardened as in ordinary curd-breaking.

William Brenton exhibited a set of Strainer Milking Buckets No. 258) manufactured and patented by T. Burns; these are said to be new, though not entered as "New Implements." These

milking pails are made of various shapes and sizes, but all of them have a projecting spout covered by a lid ; inside the pail a large piece of wire gauze covers the entrance to the spout. The fixed strainer is cleaned with a brush ; it prevents waste from spilling, and is more convenient than the separate strainer and ordinary bucket.

Messrs. Baldwin and Amies exhibited a new variety of their Steel Railway Milk Cans. A ring of vulcanized india-rubber let into the churn forms an air-tight seating for the lid, fastened down upon it by screws. At the Dairy Show held last autumn in London, railway churns were tested, to try if milk could be spilt out of them, by putting water in them and then rolling them along the ground. If it is really desirable to make churns air-tight, this is probably one of the best ways of doing it. The new churn is strengthened at the bottom, as shown in Fig. 21,

Fig. 21.—View of *Messrs. Baldwin and Amies' Railway Churn*, No. 3709.



by iron bars across it riveted on to the rim. These irons cost 2s. 6d., and can be fitted to old cans, adding greatly to the strength of the part that usually is the first to give way.

Another air-tight Railway Churn was exhibited by the *Aylesbury Dairy Company* (No. 3911), manufactured by Kleiner of Austria. The top of the can and the lid are slightly tapered to fit closely into one another ; a bead on the lid fits into a slightly inclined groove in the can, so that when the lid is turned round it is tightly pressed into the top of the can. An air-tight metal fitting of this sort is perhaps better for cleaning than one of

india-rubber, but it is liable to get jammed too tightly, and is then difficult to open. This churn is strengthened by two metal bottoms, with one of wood between them. The lower bottom is of course the one most liable to be damaged, but should any small leak occur in the upper one, it might escape observation till the milk was injured by the stale leakings. In addition to their usual comprehensive collection of appliances for dairy use, this Company exhibited a Model Ensilage Stack-Press that will be described later on.

Messrs. Manley and Hartley showed two Milk Pony Carriages, with driver's seat, for conveying milk for retail purposes. One (No. 134) with wrought-iron wheels, to take a single 20-gallon can; the other (No. 133), with wooden wheels, to take two 18-gallon cans. By raising the shafts, the can in No. 134, and the hind can in No. 133, can be taken into the cart with a very short lift; but the front can in No. 133 must either be raised with a high lift into its place, or be filled in the carriage.

The Dairy Supply Co. showed some convenient little Metal Stands for holding Eggs, and a cheap Milkman's Lock to prevent the theft of milk-cans in towns. The can is hung by the milk-carrier upon a bracket padlock, and can only be removed by the householder's key.

Dairies that set milk for cream in the neighbourhood of London have vainly endeavoured to find a market for skim-milk, sold as such, among the London poor. It is said that it can be purchased largely at 1d. per gallon, and that much of it has been thrown away as valueless. *Laurence's Lactoleoextract* (No. 4038) is an apparatus by which fats and oils can be thoroughly emulsified with skim-milk to replace the butter that has been extracted from it as cream. In order to enrich 5 gallons of milk, 1 quart of oil is thoroughly mixed by a steam jet with 2 quarts of the milk, and this strong emulsion is then stirred into the rest of the milk. The milk and the oil are placed in two vessels; a small pipe and tap regulate the flow of each into a larger pipe, where the liquids are together converted into spray by a jet of steam, which drives them into the collecting chamber in a state of thorough combination. It is claimed for this invention that skim-milk thus enriched can be profitably used for cheese-making, for confectionery purposes, and for the feeding of young stock. Mr. Lawrence states that he is now fattening calves at much less than the usual cost by giving them 1d. worth of oil added in this way to a gallon of skim-milk, which he purchases for 1d.

No. 5062 is a Calf and Lamb Feeder, made by *Fawcett and Co.*, on the feeding-bottle principle, under Hudson's patent. AA are the teats, B is a canvas bag, in which is an air and

water-tight bag of soft material, to hold the food. The bag B is secured to the frame C by brass fittings. D is the lid, secured to the frame by two thumbscrews, EE. H is a knob screwed into a hole in the lid, through which the milk or porridge is poured into the food-bag.

Fig. 22.—View of Fawcett and Co.'s Calf and Lamb Feeder, No. 5062.



In taking a general view of the "New Implements," we may note that a pause has occurred in the recent rapid progress of sheaf-binders. They have passed the experimental stage, and have reached a degree of perfection that fits them for general use on the farm. Though further improvements may be attained, they are not likely to be of such a kind as to render the present types soon obsolete.

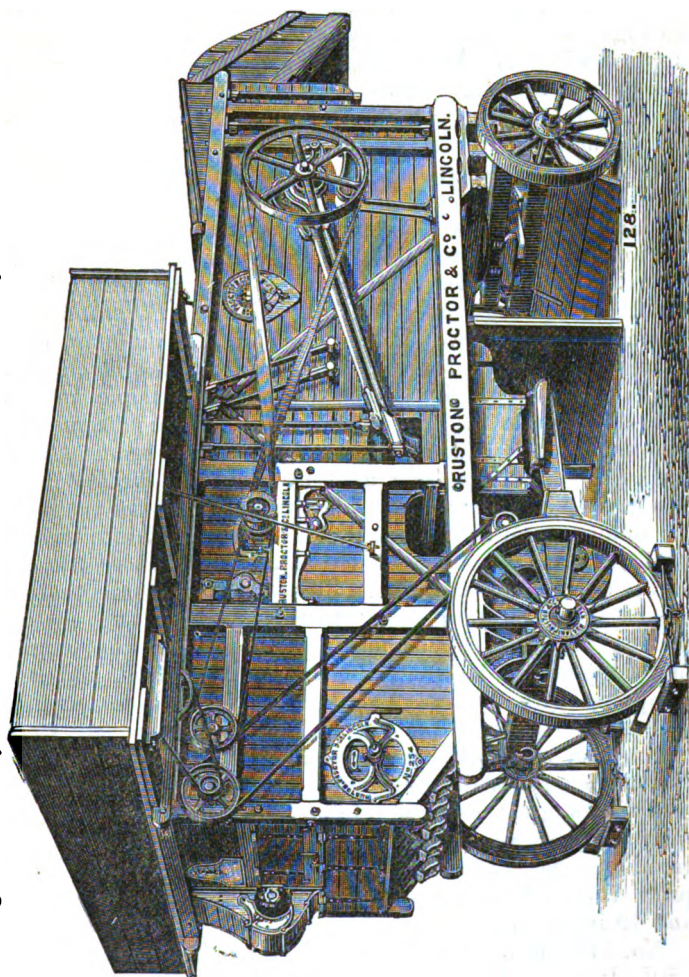
In threshing-machines we see that many makers are greatly reducing the number of wearing parts, a most desirable achievement where it does not diminish the efficiency of the machine. Messrs. Ruston, Proctor, and Co. have this year brought out a machine differing in some important respects from their former make.

Corn and seed-dressing machines and small corn mills take their full share of "New Implement" entries; as do also various

appliances for dairy-farming, mostly of a minor description. In other classes of implements there are isolated examples of novelty, but no general advance to be recorded.

No. 1765. *Messrs. Ruston, Proctor, and Co.'s Finishing Threshing Machine, with Patent Gear*, is a threshing-machine

Fig. 23.—View of *Messrs. Ruston, Proctor, and Co.'s Threshing Machine, No. 1765.*



without cranks; one plain straight shaft is used, and this drives the shakers and the shoes by means of eccentrics on each side. These eccentrics are external, and are shown in Fig. 23 behind the pulley on the extreme right. The eccentrics are connected by two cross-bars, passing through the machine from

side to side, and giving motion to the shakers. There are two pairs of rods from the eccentrics (shown in Fig. 23); the upper one drives the shoe, and the lower one the caving riddle.

The cranks of a threshing-machine are the parts that usually go first; yet other makers have adhered to them in preference to eccentrics, perhaps because the latter, with their larger bearings, are apt to fail if the attendant neglects to keep them supplied with oil. In this machine special care has been taken to secure a thorough lubrication, so that if the eccentrics are oiled in the morning they need no attention until the end of the day. There are in all six oil-cups for these parts, and four oil-holes for the carriers at the back ends of the shakers, all accessible from the outside. In an ordinary machine of a similar size there are twelve or thirteen large bearings requiring oil or grease, and ten oil-holes, most of which are difficult of access. In a double-crank machine there are twenty important bearings, only four of which can be reached from the outside. The two brasses carrying the shaft are of large diameter and extra length. The frame of the machine is of English oak, strongly braced with a new triple iron truss. The other parts of this machine are of the pattern hitherto adopted by these makers. The second fan (seen on the extreme left in Fig. 23) has been used by them for the last three or four years; it gives a direct blast to the grain descending from the smutter; and as it sends the dust, &c., back into the shoe, a stronger blast can be used with safety than where the dust is blown outside the machine. The substitution of eccentrics for cranks is a feature peculiar to this machine: the method of driving the shoes by connecting-rods is somewhat similar to that adopted by Messrs. Gibbons and Robinson, and may be compared with Messrs. Nalder and Nalder's contrivance, in which the shaker-boxes themselves are connected so as to accomplish the work here done by rods. In all these and in Foden's machines the improvements that have been introduced result in a great reduction in the number of parts subject to wear and tear, a considerable saving of oil and greater ease in running. No. 1765 is described as a 6-Horse Power Machine, price 135*l*. It has a small model drum, 4 ft. 6 inches long and 19 in. in diameter.

No. 1766 is described as an 8-Horse Power Machine, price 150*l*. It only differs from No. 1765 in its drum, which is a larger model, 4 ft. 6 inches long and 23 inches in diameter.

Great credit is due to Messrs. Ruston, Proctor, and Co. for the improvements they have introduced in these machines; but the Judges were bound to remember that other makers before them have diminished the number of wearing parts in threshing-

machines. Messrs. Nalder and Nalder made the first important step in this direction, and obtained a medal for it at Reading in 1882. In 1883, Mr. E. Foden received a medal for attaining simplicity of parts by the introduction of an exhaust fan. Mr. Bell's Report on the Miscellaneous Implements at Shrewsbury contains a description of a threshing-machine exhibited by Messrs. Gibbons and Robinson, in which they had got rid of 18 bearings and joints requiring oil.

When several makers are advancing in the same direction, it would be unfair to give any award of merit without a careful and exhaustive competitive trial. It is now fourteen years since such a trial was given by the Society at Cardiff; and the Judges are of opinion that the comparative merits of recent improvements in threshing-machines cannot be fully ascertained without a fresh competition among them.

In Article No. 4391, entered as a New Implement by *Messrs. F. Alchin, Linnell, and Co.*, the only feature of novelty is a contrivance for increasing the efficiency of the finishing dressing-apparatus. The corn, after leaving the hummeller, falls into a hopper, in which a feed-roller and an adjustable slide regulate its flow, producing a thin, wide, and even stream of corn. In its fall, this is subjected to a strong blast of wind that sends the dust and chaff back into the top shoe, while the light corn, wild oats, &c., are blown over an adjustable tailboard on to a sheet-iron shoot, which brings it to the same spout that delivers the light corn that comes from the screen. The good corn descends on to sieves, and thence to the screen in the usual manner.

The machine was fitted with a Rainforth's screen; but the exhibitor stated that this was only put in to meet the prejudices of purchasers, as the separation effected by the blast made screening unnecessary.

The Judges were not able to test the accuracy of this opinion; but it is obvious that, for a perfect separation, it is not enough to spread the corn out evenly to the blast, unless the force of the blast is maintained without variation.

As evidence of the general advance in threshing-machines, we may notice two others which were not entered as "New Implements." In *Mr. E. Humphries's* New Improved Single Crank Machine, No. 1742, the shoes are connected with the shakers in a way very similar to that adopted by Messrs. Nalder and Nalder.

Messrs. Clayton and Shuttleworth, who have been leading makers of threshing-machines for a longer time perhaps than any other firm, have marked their sense of the value of Foden's Exhaust Fan by using it in their No. 1776 machine, adhering in other respects to their usual design.

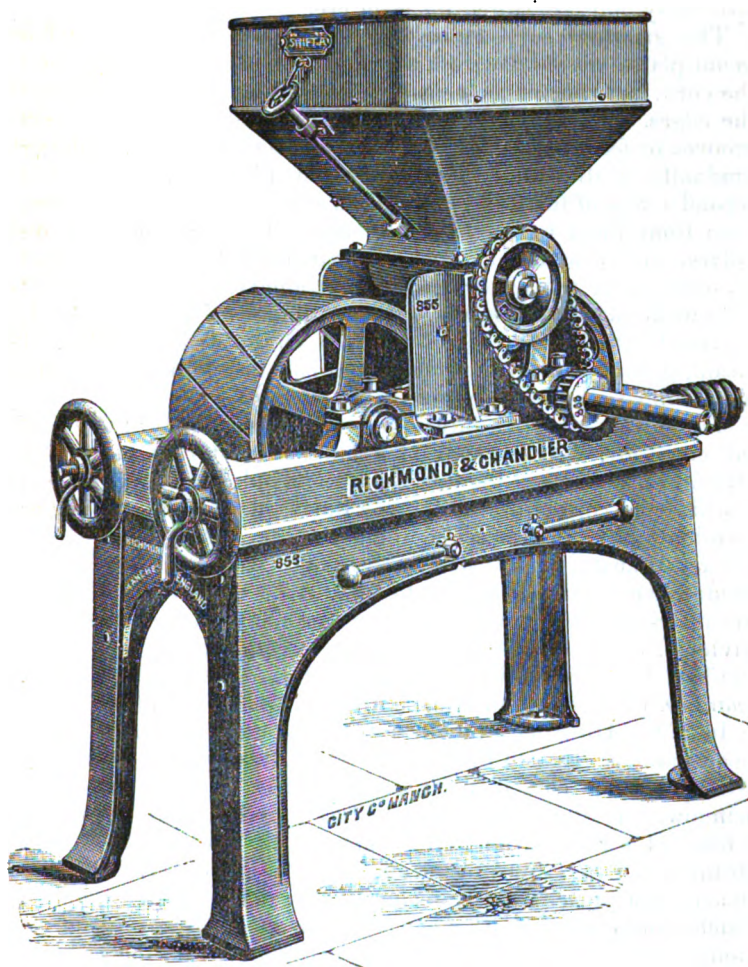
There were four exhibitors of novelties in small flour mills for hand or horse power. Although these implements are of little use to an English farmer, unless they can be also used for kibbling or coarse grinding for cattle, they are of great value to colonists and to small farmers in France and Italy, and are still used to some extent in the remote districts of Scotland, Ireland, and Wales. The chief characteristic of *Messrs. Nicholson and Sons* "Sampson" Corn Mill, No. 172, is that the concave as well as the cone of grooved steel revolves. Their rotation is in the same direction and on the same spindle; a sun and planet gearing causes the cone to make 400 and the concave 57 revolutions per minute. This would be equal to 343 revolutions of the cone, if the concave were stationary. The concave can be made to revolve in the opposite direction, and one would have supposed that the same result might be obtained with less power by driving the cone at 300, and the concave in the opposite direction at 44 revolutions per minute. The makers, however, state that a much softer sample of flour is obtained by making the concave follow than by keeping it stationary, or making it revolve in the opposite direction. The revolution of the concave prevents any undue wear of any part of its surface. The wear is thus regularly distributed over the whole surface of both the grinding parts. These mills work easily, and since the abolition of the oppressive grist-tax in Italy, many of them have been sent to that country, fitted with hand gear, for domestic use among the peasants.

As a general rule stone mills are horizontal, and metal mills are vertical; it is singular that the two sorts of new mills that remain to be described are both of them exceptions to this rule. In No. 454, *Messrs. Jeffery and Blackstone's* "Stamford" Stone Mill, the stones are vertical. Hitherto there has been a serious objection to vertical stones from the caking of the flour upon the casing of the mill, often to the extent of one inch in thickness, where it was liable, if left, to ferment, in consequence of the heat developed in the grinding, and subsequently to drop off and spoil the meal. This is obviated in the new mill by fitting the brushes on the back and on the periphery of the running stone; these act upon the internal surface of the casing, and by their revolution keep a current of air moving round between the stone and the casing. These brushes not only act as fans to keep down the temperature, but also serve as lifters to raise the product as it is formed to a spout sufficiently high to deliver it into a sack or flour dresser standing on the floor of the building. The exhibitor stated that linseed can now be satisfactorily ground by this mill.

In *Messrs. Richmond and Chandler's* Corn Crusher, No. 2220,

shown in Figure 24, the crushing, splitting, and kibbling, are effected by two large iron rollers, diagonally fluted. By a patent parallel adjustment the rollers may be set any distance apart, to suit the various sizes of grain, by turning a hand-wheel at

Fig. 24.—*Messrs. Richmond and Chandler's Corn Crusher, No. 2220.*



the front. A new patent spiral spring arrangement has also been introduced. This allows any hard substance, such as nails, bolts, &c., to pass between the rollers without breaking the wheels or damaging the main frame.

New Grinding Mills of Wood's Patent were exhibited by two firms. Those of a smaller size by *Messrs. Hunt and Tawell*, and larger ones by *Messrs. C. Burrell and Sons*. The smallest size costs 2*l.*, and is said to be especially suitable for grocers to grind rice, coffee, &c.; the next size is priced 4*l.* 4*s.* for Colonists. The larger sizes cost 7*l.* 7*s.*, 16*l.*, and 24*l.*, respectively, and are suited for farm use.

The grinding surfaces of these mills are two circular flat metal plates placed horizontally, and so grooved or fluted that the corn, entering at the centre, is ground before passing out at the edges. These plates are so dressed, that a series of main grooves or feeders run tangentially from the feed-tube, becoming gradually shallower as they approach the circumference; a second series of furrows, drawn at an acute angle to these feeders, runs from them to the circumference. The bottom plate revolves, and is carried on a central bearing that allows it to find its own level; the upper plate is stationary. During a short trial we found that *Messrs. C. Burrell and Sons'* mill, No. 4224, driven by their own 8-horse power engine with 40 lbs. of steam, ground a bushel of barley satisfactorily in 7½ minutes, and kibbled a bushel of maize in 2½ minutes.

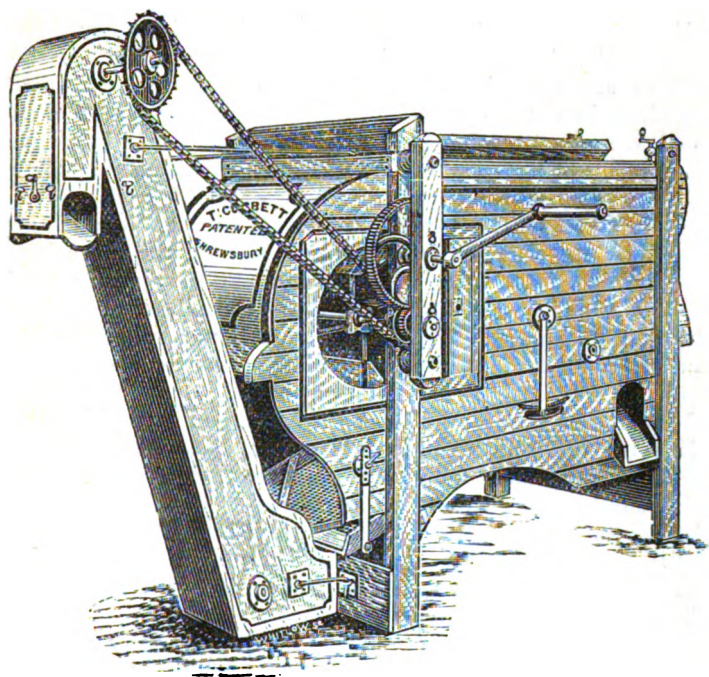
There were two exhibitors of new implements for the use of millers. *Mr. F. Nell* showed a Dust Collector of Howarth's Patent, for collecting the dust from the wind discharged by fans working in corn mills and other dusty places, and a purifier forming part of the same machine. *Messrs. Nalder and Nalder's* Rotary Wheat Sizer consists mainly of a barrel with the mesh gradually expanded from end to end. A set of movable dividers are placed under the barrel, and by a proper adjustment of these dividers, which can be made without stopping the revolution of the barrel, the bulk of corn is divided into four sizes of *equal quantity*, thus giving an even continuous feed to each first break.

In Corn Dressing Machines the first novelty exhibited did not commend itself to the Judges. In Long's patent, exhibited by the *Maldon Iron Works Co.'s*, No. 1167, the corn after it is winnowed is elevated automatically for delivery into sacks by a blast of air from the fans. When corn is elevated thus by steam power in a threshing-machine, the waste of force is not of much consequence; but it is clear that manual labour is applied much more economically when the man stops winnowing occasionally, so that he may lift the corn by shovel into the sack.

In *Mr. T. Corbett's* New Eclipse Winnowing Machine, No. 2435, the grain is elevated with much less waste of power by a creeper. A toothed pulley on the fan-spindle of the machine by means of a pitch-chain drives the upper spindle of the elevator, as shown in Fig. 25. There are the two delivery spouts to the

elevator and a turn-over slide, so that the tins of the creeper deliver the corn into sacks placed alternately on either side. The machine is fitted with a new transverse motion to the riddle case, and the screen attached to it. The front part of the riddle-frame is fitted with a bar, having turned pins extending on either side, and passing through brasses in the side of the machine. To

Fig. 25.—View of Mr. T. Corbett's Winnowing Machine, No. 2435.



the centre of the bar a pivot is fixed, on which a rod with a universal joint is placed, the other end being connected to a pin in a crank-wheel working on the side of the machine. The back part of the riddle-frame is carried upon chains. By this arrangement a transverse motion is obtained, and all parts of the riddles are made to move at the same speed. In ordinary winnowing-machines the riddle-frame turns upon a centre at one of its ends, and, being driven by a crank at the other end, the motion is curvilinear, and different parts move with different velocities. To obtain uniformity of feed, the hopper of this machine is fitted with a roller, with iron projections, driven by a strap from the main spindle. A portable hinged board is

placed in the hopper, with its lower end resting upon the roller ; the grain or seed is thus agitated by each movement of the board, and no attendant is needed to stir up the feed, even when rye-grass is being dressed.

Mr. W. B. Stubbs is a new exhibitor: the chief point of novelty claimed in his two Corn Dressing Machines, Nos. 2523 and 2524, is that the winnower and elevator being in one frame, the machine is more compact, cheaper, and firmer in work than separate machines on the old plan.

Messrs. J. Richardson and Son's No. 2693 is a large Seed-Dressing Machine, more useful to a seed-merchant than a farmer.

There are several entries of presses for silos, which will be noticed in detail. Chaff and ensilage cutters and elevators have had much attention paid to them ; and it may be noticed, as one result of last year's trials, that the chain and shuttle has generally replaced the travelling web for elevating silage.

In the Chaff or Ensilage Cutter and Elevator, No. 1168, exhibited by the *Maldon Iron Works Company*, the elevation is done by blast from a fan, which makes 600 revolutions to the 150 revolutions of the knife, and the speed is got up by short belts and pulleys. A blast elevator is better suited for chaff than green fodder : as compared with a creeper elevator it is cheaper in first cost, but wasteful of power.

Messrs. Richmond and Chandler's Ensilage Cutter, No. 2219, is like the one they exhibited last year, but with a new and excellent arrangement for winding up the trough by means of a chain round a roller carried on a frame.

In *Carson and Toone's* Ensilage and Chaff Cutter the chief novelty is the use of the chain and shuttle, just referred to as commonly replacing the web that was used by these and other makers last year.

Messrs. J. Crowley and Co. have introduced a very ingenious movement into their Chaff Cutters 2087 to 2090. A single lever serves to stop and reverse the knives when the handle is moved parallel with the feed ; it also changes the length of the cut when the same handle is moved at right angles to the feed.

The Ensilage Cutter and Elevator which they exhibited at Preston differs little from the one they showed last year.

From ensilage cutters we may pass on to notice other new appliances for the preservation of silage. *Messrs. Bayliss, Jones, and Bayliss* exhibited an ingenious Convertible Iron Silo, with sides composed of flat galvanized-iron sheets, 10 feet deep by 2 feet wide, securely wedged between strong tee-iron uprights with packing between, to make them air- and water-tight. Horizontal bars are placed round the outside, about 14 inches apart, threaded through the stalks of the tee-iron. The roof is made of curved

corrugated sheets, with iron framing underneath. The chains for raising or lowering the roof are fitted with hooks; to these two or three of the weights of the pressure apparatus can be hung as balance-weights, and the roof raised with their aid by one man. The design is well worked out; but the cost of these, and probably of all iron silos, must be very much against their use. A silo to hold 16 tons, at 50 cubic feet to the ton, costs 17*l.*; its roof and door, 7*l.* 10*s.*; apparatus for pressure and covering boards, 13*l.* 12*s.* 6*d.*; making a total of 38*l.* 2*s.* 6*d.* The same items for one to hold 60 tons amount to 42*l.*, 17*l.* 17*s.* 6*d.*, and 49*l.* 10*s.*, making the total 109*l.* 7*s.* 6*d.*

Pressure is obtained by fixing two pulleys on each end of the pressure beam and one pulley on the ground. A chain with one extremity anchored to the ground is then passed round the three pulleys, and cast-iron weights are hung upon its other extremity. In this way a weight of 10 cwt. at each end of the beam gives a pressure of 2 tons. On a silo 16 feet by 10 feet 8 inches, with two beams, an actual pressure of 8 tons is applied, equal to 112 lbs. per square foot.

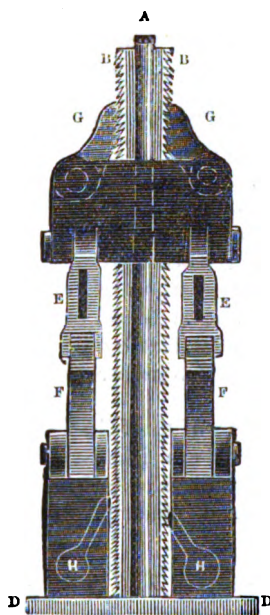
I have been unable to obtain an illustration of the Silo Press No. 1148, exhibited by *Mr. W. Shuker*, but am indebted to *Mr. F. S. Courtney*, our Assistant Engineer, for the following description of it, and also for the illustrated description of *Messrs. Moore and Co.'s Press*.

"Mr. W. Shuker. Silo Press, No. 1148.—On either side of the silo wall, and extending from top to bottom of the same, an upright pillar is securely attached, with a rack upon it extending for about three-fourths of the distance from the top. A pressure beam extends across the silo between the above-mentioned pillars, carrying at its centre two windlasses, and at either end two fulcrum castings. A chain from either windlass is attached to the end of a long lever, the other end of which engages in a movable casting in the upright rack pillars, the fulcrum being at the end of the pressure beam. Each travel of the lever gives 3 inches compression at the end of the beam, and a paul engaging in the rack-pillar keeps the beam down while a fresh purchase is being taken with the lever. By repeating this operation the silage is compressed firm, and in order to keep up *continuous pressure* upon it, a wrought-iron lever, with a dog-bar engaging in the ratchet-wheel of the windlass, is attached. A weight of 100 lbs. on the end of this lever, gives a continuous pressure of 12 tons at each end of the pressure beam. When the pressure beams have been worked low down in the silo, they may easily be hoisted up to the top again by removing the main lever and attaching the chain from the windlass to the end of the beam, leading it over a pulley in a movable casting in the upright rack pillars and then working the continuous-pressure levers.

"Messrs. Moore & Co. Silo Press, No. 2691.—This machine (Fig. 26, p. 728) consists of a vertical bar (A) fixed securely to the bottom of the silo, and extending to the top of the same. Two cast-iron serrated cheeks (B B), about 3 feet long, are attached to the upper part of the vertical bar. The position of these cheeks may be varied at will, as holes are provided some distance down the bar, so as to allow of the subsidence of the silage.

The silage being planked over, two cross-beams are provided, which carry the bracket (D D), on which the press gear is mounted. The press gear

Fig. 26.—*Messrs. Moore & Co.'s Silo Press.*



consists of two segmental-castings (E F), which engage into each other by means of serrations on their curved face. The lower segment (F) is pivoted on a pin fixed in the lower casting, which rests on the timber across the silo; the upper segment (E) is pivoted on a bridle-casting surrounding the vertical bar, about which it is free to move. A loose paul (G), mounted on this bridle-casting, engages in the serrated cheeks of the vertical bar; a similar one (H) is also mounted on the lower casting. One of the sides of each of the segments is $\frac{3}{4}$ th of an inch longer than the other. A long lever handle actuates the upper segment. When the lever handle is raised, the shorter sides of the segments are in gear; in descending, the longer sides come into gear, which give a travel of $\frac{1}{2}$ of an inch. The paul engaging in the serrated cheeks prevents the upper casting rising, and the tension on the vertical bar is transmitted through the bottom casting to the cross-beams. On the upward stroke of the lever the shorter sides of the segments engage each other, and the pressure is relieved, any tendency of spring in the silage being taken up by two eccentric pauls, mounted on the bottom casting, which prevent it rising; consequently the upper casting descends just to the same extent as during the previous travel by the time the lever handle is fully raised, and is in position for giving another $\frac{1}{2}$ in. travel on the down stroke of the lever.

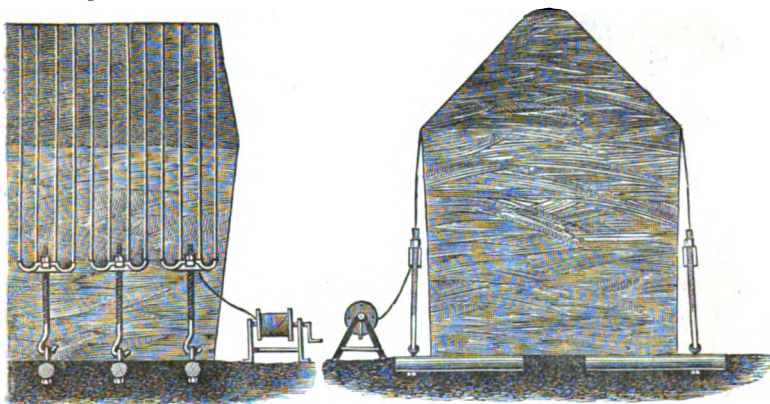
The total weight of the apparatus (exclusive of the vertical bar) is only 1 cwt., and it is very easy of removal to another silo or second vertical bar in the same silo. The pressure obtained by this apparatus on one bar is said to be sufficient for silos up to 12 feet square; beyond that size a second vertical bar is advisable. The cost of the apparatus without the bars is 4*l.* 4*s.*

No silo presses at all are required in the system shown in model by *Messrs. J. and F. Howard*, of Bedford, and executed by them on a large scale for Mr. R. Whitehead, the inventor of the well-known torpedo. The silos are built of brick and covered by an iron bell, the edge of which stands in an annular trough filled with water. Thus instead of excluding air by means of heavy pressure, the silage is filled into a silo made air-tight by the water joint. If this method of bottling silage on a large scale should be successful, it will be an innovation of much importance; but in bottling fruit or vegetables for domestic use, is not the application of artificial heat, in some form, necessary to success? The ordinary methods of preserving silage may be described as a combined effort to express and exclude the air. *Messrs. Howard's* plan relies upon exclusion alone;

while others are seeking to preserve green fodder in silage stacks closely compressed, but otherwise protected by nothing but a roof to shoot off the rain.

A model of the Ensilage Stack Press, manufactured by *Mr. C. G. Johnson*, was exhibited at the stand of the Aylesbury Dairy Company, and is partially represented in Fig. 27. The end of a flexible galvanized-iron wire rope is looped on to a crutch at one end of the cross-heads, which move loosely up and down on the screwed bars made fast to logs of wood, which are held down by

Fig. 27.—*Mr. C. G. Johnson's Ensilage Stack Press*, No. 3957.

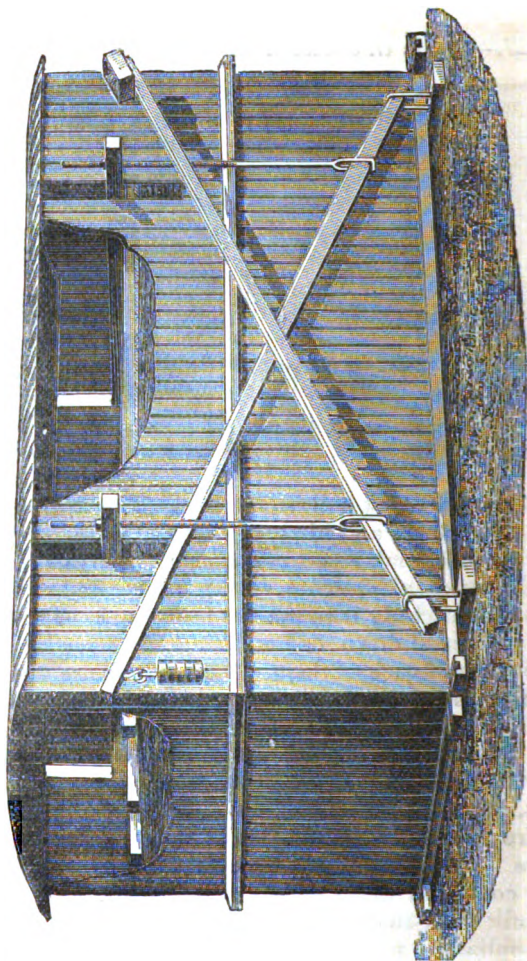


the weight of the stack built upon them. The rope is passed over the top of the stack, and hitched on to a corresponding crutch at the other side, and, returning at short intervals, is laced over the whole series of crutches on all the cross-heads, and then made fast by hitching it round the last crutch. The cross-heads are then tightened down, one at a time, by screwing the nut on the upper side of each of them. The screws are 4 feet long, to allow amply for the settling of the stack between one day's stacking and the next. The reel shown at the side of the stack is not used in tightening; it is merely used to wind the rope on when out of use. The screws are so adjusted that the spanners, pulled with a force of 40 lbs., exert a pressure of $1\frac{1}{2}$ cwt. per square foot on the stack. When the silage is used, the wire ropes are thrown off from one cross-head at a time, and the pressure continues undisturbed on the remainder. The stack can be built peak-shaped, and thatched over the wire rope.

The appliances needed for a 30-ton stack, 11 feet square by 11 feet high to the eaves when settled, include 3 pairs of screws with cross-heads, wire rope, reel, 6 spanners, and 2 hand-wheels for running back the nuts; the whole costing 9*l*. A 200-ton

stack, 23 feet square by 15 feet high to the eaves when settled, would require 6 pairs of screws and cross-heads, wire rope, reel, 12 spanners, and 2 hand-wheels, at a cost of 18*l*. This small outlay includes all that is required, except the logs of wood to which the screw-rods are fastened, and a few rough pieces of wood laid across them to give better hold of the mass. The logs should be 6 or 7 inches in diameter, and long enough to reach nearly to the centre of the stack ; they should be placed 4 feet

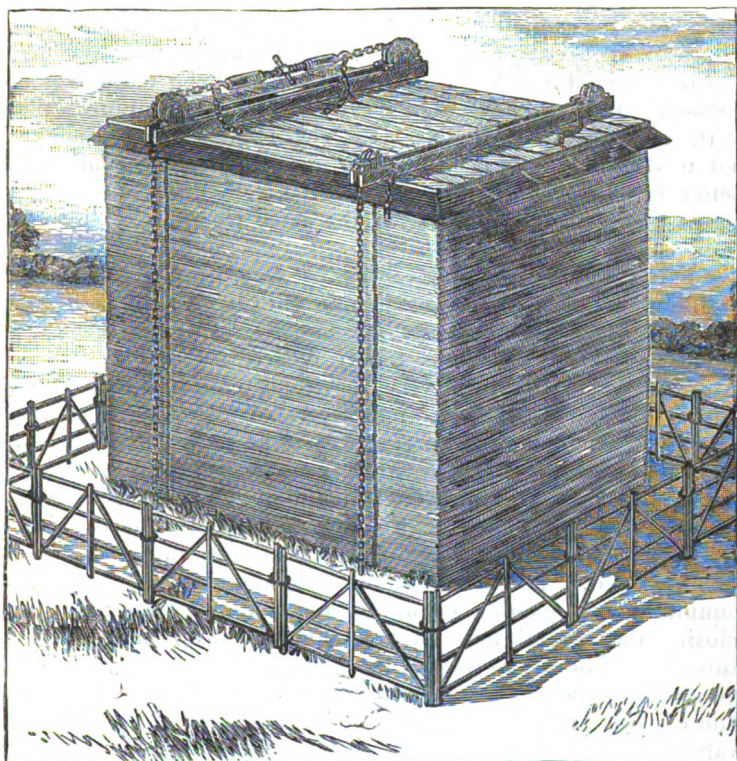
Fig. 28.—*Mr. E. T. Blunt's Screw and Lever Silage Press, No. 5277.*



apart. It is obvious that the long screws exposed to the weather must be kept well oiled, or they will soon be injured.

Mr. E. T. Blunt's Patent Screw and Lever Press, No. 5277, is intended to be used either for silos, as in Fig. 28, or for silage stacks. The silage is covered by a platform of boards, and placed upon this are two strong beams, with screwed rods passing through their ends. Levers are then placed on both sides of the silo or stack in the stirrups at the bottom of the rods, and fulcrumed to staples or other fastenings. Each cwt. placed at the end of the lever gives a pressure of one ton upon the silage. As the silage sinks, a continuous pressure is kept upon it by the fall of the lever. By screwing down the nuts at the upper end of the iron rods the levers are raised again into position. One pair of iron rods screwed 3 feet is reckoned enough for 120 superficial feet of stack. These, with wheels, wrench, fulcrum, and

Fig. 29.—*Messrs. F. W. Reynolds and Co.'s Silage Stack Press, No. 5278.*



lever-tips and fulcrum-staples, cost 3*l.* 10*s.* This, of course, does not include the cost of the wooden platform, beams, and levers. 1

Fig. 29 shows the method in which *Messrs. F. W. Reynolds and Co.* apply to stacks of silage their well-known chain appliances, with screw-tightener and rollers. The requirements are the same as for a silo, the only difference being that the chains in a silo are pressed by the silage close to the walls, while in a stack they may be a few inches away from the sides. The apparatus is arranged to put a pressure upon the silage of 8 tons by each beam on an area of 90 square feet, giving a pressure of 200 lbs. per square foot. Exclusive of the wooden beams and covering boards, the permanent attachments for each beam, consisting of two 20-foot special tested chains, brackets, screws, plates, and pins, cost 3*l.* A 4-ton screw chain-tightener, 4*l.*; two cast-iron chain-rollers, 1*l.* These two last items serve for any number of silos or stacks.

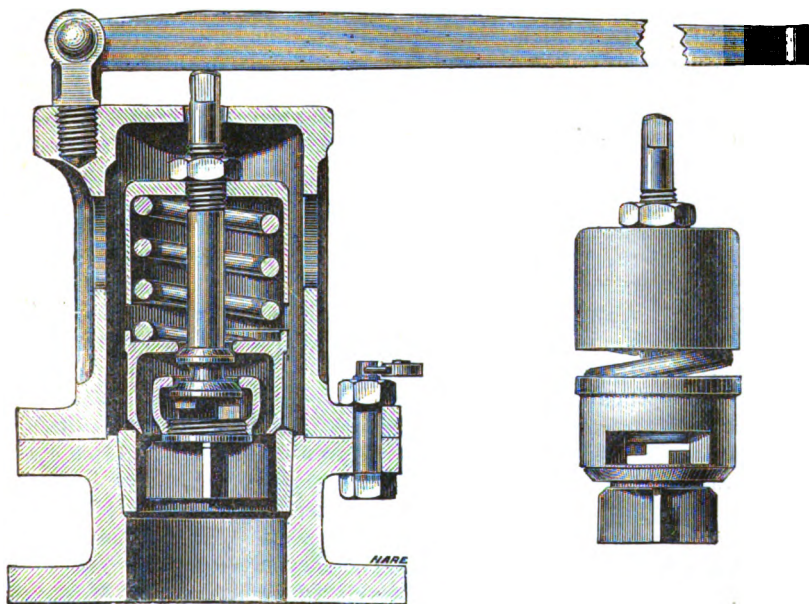
The subject of the preservation of ensilage is one of the most interesting agricultural topics of the day; and additional interest will be excited in it by the competition for Sir Massey Lopes's munificent prize of one hundred guineas "for the best silo in England and Wales, in actual work during the winter of 1885-6." It would have been pleasant to mark our appreciation of the efforts made to produce a thoroughly good press for silage; but medals can only be given for new implements, and it is better to wait till a full trial can be given to all the various contrivances designed to attain the same result.

Having noticed all the novelties that can be grouped together in different classes, it only remains to consider singly those that are left, taking them as they occur in the Catalogue.

No. 166, The Absolute Safety Valve, by *Messrs. W. N. Nicholson and Son*, is a very ingenious combination of the ordinary lever and the lock-up safety-valve, which automatically defeats all attempts at tampering with it. Externally it presents the appearance of a rather large lever-valve; but if a driver, more eager than careful, were to try to get more than the regulation pressure by hanging a coat or other object on the lever, he would find the valve blow off steam at once until the offence was removed. The sectional drawing shows that there is an annular valve opening outwards, and a double internal valve closing the central hole in the annular valve, and opening inwards. These two valves are connected by a spiral spring, accurately adjusted to the required maximum boiler pressure, and enclosed in a lock-up case; this case, forming part of the valve, cannot be tampered with when at work. The spindle of the internal valve projects through the case, and is weighted by the lever in the usual way; should any extra weight be put on the lever beyond that to which the valve is set, it will

compress the spiral spring, open the internal valves, and allow steam to be discharged until the over-weight is removed. It is also impossible for pressure to increase on the internal valve, as the lower of the two valves, having the larger area, is at once depressed with the least increase of pressure. As compared with an ordinary lever, this valve gives very great security; but its superiority to the usual lock-up spring valve adopted by many of our exhibitors is not perhaps sufficient to cause it to be much adopted in agricultural engines. For marine and

Fig. 30.—Messrs. W. N. Nicholson and Son's Absolute Safety Valve, No. 166.



other large engines a very slight increase of security is cheaply purchased by giving nearly double the usual price of a lock-up safety-valve. For ordinary farm work a good lock-up spring safety-valve will probably suffice; for even this amount of security is not universally provided. The powerful engines sent out by Messrs. John Fowler and Co. are ordinarily fitted with the lever-valve alone; probably because they are satisfied that their boilers have an ample margin of strength to stand occasional tampering with the safety-valve.

No. 414, Messrs. Davey, Sleep, and Co.'s "Matchless" Turn-wrest Plough, for turning the land upside down, has been already

mentioned as one of the implements used in testing the whippie-trees. In general construction this plough is similar to the Climax Plough of these makers, but two novelties have been introduced; 1st, a disc coulter pushes the last drawn furrow further away, to make room for the next slice to be turned so completely upside down that no turf is allowed to come near the surface; 2nd, the angle of the plough-share is neatly adjusted by means of an excentric bolt in the share-lever. An arm is extended at right angles, from the beam hinged to it near the centre of the plough, with a brace to strengthen it, also hinged to the beam; at the extremity of this arm a bar is attached in a position parallel to the beam, and at the ends of this bar, by means of adjustable clamps, the two disc-coulters or pressers are attached, one to follow each mould-board of the turn-furrow. These pressers are set obliquely to the beam, and almost parallel to the mould-board, and at such a distance that the disc partly rubs off the side of the last furrow, and at the same time shoves the furrow bodily away, pressing it hard up against the previous furrow. When the plough turns, the disc bar is swung over to the other side of the beam, the first coulter is idle, and the second one in work. The furrow, being completely turned upside down, lies much more solidly upon its face than an ordinary furrow that lies obliquely upon the previous furrow, and touches the subsoil chiefly at one corner. This will be a great advantage in ploughing for wheat on light land, for no skim-plough is needed, and the solidity of the land will assist the wheat to stand the frost. The adjustment of the share is effected by means of a share-lever or neck running back to the body of the plough; a stout bolt with an excentric shank passes through the plough body, its shank passes through a slot in the lever. By turning the bolt the lever is raised or lowered, and the share can be adjusted to any depth from $\frac{1}{8}$ in. to one inch. A nut secures the bolt in its position after adjustment.

No. 1129, Galvanized Wire Fence, manufactured by *Messrs. Bruce and Still*, of Norfolk Street, Liverpool. The standards are of light galvanized wrought-iron, of a figure-of-eight section tapering to the top, where it receives a solid cap; it stands 4 feet out of ground; there are six lines of 7-ply galvanized-wire strand. The top one is of No. 4 B. W. gauge; the other No. 5 of No. 6 B. W. gauge, with cast-iron straining pillar to each 220 yards; price, 1s. 5d. per yard.

Mr. William Turner, of Newton, North Wales, exhibited a new Sheep Rack and Trough Combined, No. 1403. The roof is of galvanized corrugated iron, in two parts; the movable part extends the whole length of the rack, and is raised over on to the stationary part. The chief feature of novelty is the introduction

of a foot-lever, to enable the shepherd to raise the roof by the action of his foot when his hands are full. The lever is said to have the further advantage of keeping the roof from being blown open by the wind. It is hardly worth while to complicate the construction of a sheep trough to this extent for the sake of so small an advantage to the feeder.

Messrs. Catchpool, Stannard, and Stanford exhibited two Pulverizers or Revolving Harrows, of Stanford and Button's patent; one, price 18*l.*, to cover 7 feet, stated to be intended for three horses; the other, price 13*l.*, to cover 4 feet 6 inches, for two horses. The Judges were of opinion that the larger implement would give plenty of work for four horses, and they had it at work in the field throughout the competitive trial of the four-horse whippetrees.

The pulverizer consists of a wrought-iron frame, with cast-iron bracket, with loose bearings fixed to each side carrying two axles fitted with curved steel prongs, which revolve as the implement is drawn forward. The frame is mounted on wheels; this gives a ready adjustment for harrowing the land deeper or shallower, as may be required. On arriving at the end of the land, the driver releases a lever, and the forward motion of the horses at once lifts the harrow clear of the ground. The harrow was worked both in the line and across the furrows of the newly ploughed land, and made fair work, the soil being very dry and of a friable nature. This is a well-made modification of the old Norwegian harrow—an implement usually made with straight prongs or teeth, but which was also tried with teeth curved like these. In either form it met with a very limited sale, and though specimens are still to be seen on farms, they are usually found hidden away among the disused implements.

No. 1432, *Messrs. Nichols, Richardson, and Co.'s* Eight-furrow Turn-wrest Plough has been constructed for steam ploughing from three to six inches deep on medium and light land. The frame is of very light construction, and probably easy of draught. No time is lost at the end of the furrow, but a very wide headland is left. Shallow ploughing on light land is usually done by horse rather than by steam, and the use of such an implement in England would probably be limited to the hurried cultivation required for catch crops.

Various modifications of an excellent Canadian Sharpener, for the knives of reapers and mowers, were shown by different exhibitors. In one of them, entered by *Messrs. Murray and Co.* as a new implement, a special adjustment has been introduced by which the position of the knife is altered as the circumference of the stone is diminished by wear; extra holes are made in the knife-holder, and its position is changed by

shifting pins from one to the other of these. In the Knife-sharpener exhibited by *Messrs. B. Reed and Co.*, a hunting tooth in the gear ensures an even wearing of the stone by preventing the points of the knife from coming repeatedly in contact with the same part of the stone.

Messrs. Murray and Co. also exhibited a new implement, No. 1508, in which a small coulter with double wings precedes, and two covering coulters follow, their well-known potato planter. Upon land that has been ridged in the usual way, this machine, with the horse walking in the furrow, cuts open the centre of two ridges, plants the potatoes, and covers them up. In using the machine there is, of course, no opportunity for putting the manure in with the potatoes; but it will be useful where light sandy land has been manured in autumn. In a wet climate it may be doubtful policy to manure such land in autumn, and the invention may perhaps be of most service in the Colonies, where labour is scarce, or in very large fields on the Continent.

No. 1559, *Patent Combination Machine*, by Mr. T. W. A. Evans, of Rumsey House, Kidwelly, Caermarthen, South Wales; price 18*l*. Convertible into double mould-board plough, double turnip and mangold drill, horse-hoe for turnips and mangolds, and potato digger. Though combined machines are too often like Jack-of-all-trades—master of none—this ingenious arrangement may perhaps be adapted to the requirements of small farms in Wales, where the labour is chiefly performed by the farmer himself; on many farms it is too often the case with such machines that the different fittings are not to be found at the time they are wanted for use.

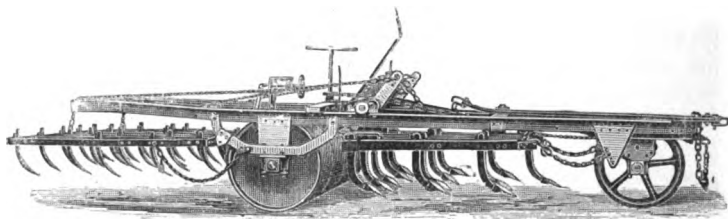
No. 1560, *Mr. D. Jones* exhibited a Drill for Root Seeds, for which it is claimed “that it drops the seed with the manure where the root should grow *only*, not leaving manure for the nourishment of weeds all over the field.” “Sowing at intervals of 18 or 20 inches, it leaves the plants at equal distances, both longitudinally and transversely, and allows the horse-hoe to work through the length and breadth of the land.” The Judges did not submit this little hand-drill to a trial, believing that it is never desirable and seldom safe to concentrate in this way the whole of the artificial manure in spots just under the seeds.

No. 1654 is an Anglo-Canadian Corn Drill, by *L. R. Knapp and Co.*, in which a clutch applied to each of the distributors enables the drill-man to shut off any single drill, or to stop the whole of them simultaneously. Although a similar arrangement has been for a long time used in Suffolk drills, it is said to be a novelty in Canadian drills. It will save much seed that would otherwise be wasted on the headlands.

Messrs. J. Fowler and Co. exhibited three new implements that attracted much attention and interest. No. 1798 was a Compound Road Locomotive, arranged to drive all four wheels, the hind ones by a pitch chain on the near side, and the leading wheels by a pitch chain on the off side. By means of a "jack-in-the-box" gear the front axle can be turned in any direction in steering, and adjusts itself to the inequalities of bad roads. It would seem an easier matter to drive all the wheels in an engine running upon rails, and never varying in their circumference, than those in a traction-engine liable to vary somewhat with the quantity of dirt that occasionally adheres to their surface; but traction-engines are often stopped because bridges are not strong enough to bear their weight, and a light engine driving all four wheels will be as efficient as a heavier one that only drives two; the latter might stick fast in soft or rough places, where the former could pass through or over the obstruction. The "jack-in-the-box" gear, as at present arranged, seems somewhat near the ground if it is intended to work in soft places.

No. 1799 is a plough for ditching purposes on the balance principle, that has been supplied by Messrs. Fowler and Co. to the South Australian Government, and extensively used by them to form the miles of ditching that leads water in the rainy season into the great tanks and reservoirs required to retain a supply for stock through their long-continued seasons of drought. It is designed to make a ditch in two operations, 2 feet 6 inches deep, 1 foot wide at the bottom and 2 feet wide at the top. There are two skifes, each with three cutting edges, to cut the bottom and the two sides, and followed by a very large breast that turns the huge furrow to one side of the trench. The first skife cuts the soil to a depth of 15 inches, and the second finishes it to the full depth of 2 feet 6 inches. It is intended for use in making ditches and for tile draining in England.

Fig. 31.—Hitchcock's Patent Implement for Cleaning Land, No. 1800.

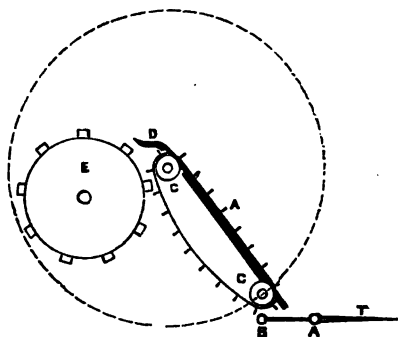


Messrs. Fowler and Co.'s third implement, No. 1800, shown in Fig. 31 (Hitchcock's Patent), is intended to clear land of couch, and finish it at one operation when it is in a dry state in

spring or after harvest. It first cultivates the land, then consolidates it by the heavy roller, and then cultivates it a second time. In the after-cultivation the tines are placed close together, so that the land may be left fine. The implement being carried upon the roller at the centre, does not sink in soft land, and the front wheel aids in keeping the depth true. The use of the roller will lessen the danger, in steam cultivation, of leaving the land too loose in dry seasons. The width covered is 7 feet, and the implement turns round at the ends in the same manner as the ordinary cultivator. It can be worked with 14-horsepower engines.

In spite of its unprepossessing appearance and rough workmanship, the Judges very carefully examined and considered the combined Horse Rake and Haymaker (No. 1838), exhibited by *Mr. T. H. Ramsden*. As it was evidently a crude attempt to carry out a novel idea, we were anxious not to pass on until we had considered the merit of the notion, as well as its imperfect embodiment. The inventor has set himself the problem of remedying the following defects that he thinks of great importance; 1st, that ordinary horserakes stop raking when they are lifted to empty themselves, so that the hay is dropped on unraked ground; and 2nd, that the revolving finger-points of haymakers cannot safely be set so close to the ground as to prevent their occasionally missing and hiding sunk pieces of wet hay. In this machine the raking and delivering are two distinct operations. I am indebted to 'The Engineer' for

Fig. 32.—Diagram illustrating *Mr. T. H. Ramsden's combined Horse-rake and Haymaker, No. 1838.*



the accompanying diagram (Fig. 32), which, in the absence of any complete illustrations, shows the chief mechanical details of the implement when it is arranged as a haymaker. Instead of the ordinary teeth of a horserake, there is a set of horizontal

teeth, T, similar to the fingers of a reaper, pivoted at A, and set by levers connected at B. The hay collected by T is carried up the face of an iron apron, A, by teeth projecting from an endless chain, passing over the rollers C O, and is delivered at D, on to the revolving drum E, which acts as a spreader. The dotted circle in the diagram indicates the position of the travelling wheels of the implement. When used as a horse-rake, the drum E is removed, and its place is occupied by a simple delivery receptacle, which, when filled, is emptied without stopping the raking. The load in the receiver is carried by the travelling wheels, instead of being pushed on by rake teeth in the usual way. The whole crop is thus lifted and dropped lightly for drying in windrows. The exhibitor hopes to add a cocking attachment to the implement. The idea might perhaps be worked out to good effect if the inventor were associated with some good manufacturing firm.

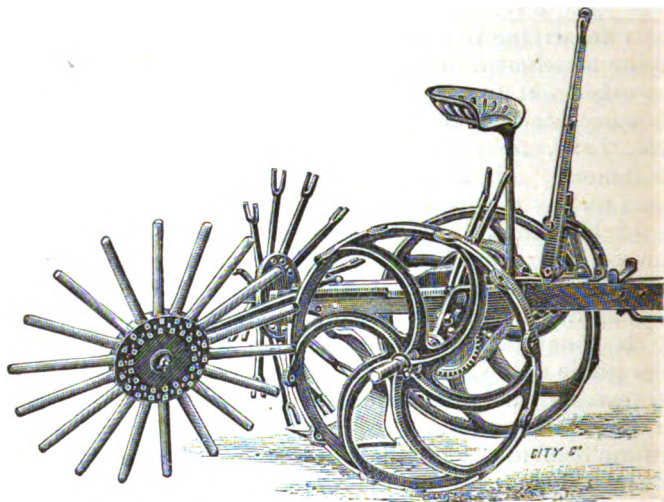
No. 1890, *Messrs. Jenkinson and Giblett's* Sheaf Binding Attachment. Mr. Jenkinson's Patent attachment is intended for use on any self-delivery reaper; it was exhibited attached to one of Hornsby's Progress Reapers. The reaper platform is removed, and there is substituted for it an endless travelling web, with slats upon it to keep it extended, and to aid in carrying the cut corn to the binding apparatus. The endless web is connected at its edges with pitch chains, which pass under guide pulleys, and the web travels over three rollers. The web travels in a horizontal plane the length of the cutter bar, and then rises obliquely to deliver the cut crop to the sheaf platform provided with the upper works of an Appleby Sheaf Binder. The rakes of the ordinary self-raking reaper are removed; and to the centre of the rake-arm 6 long flexible fingers of leather and steel are attached, intended to hold the corn in its ascent against the rising part of the travelling web. We had no opportunity of trying the machine in the field, but it was obvious that these fingers would not succeed, as then arranged, in holding the corn sufficiently against the apron to secure its being raised with regularity to the platform. It is an interesting and promising attempt to enable those who are already possessed of self-delivery reaping-machines to convert them into sheaf binders; but it requires further development to achieve complete success.

No. 1937, *Messrs. H. Bamford and Sons'* Progress Haymaker, is furnished with a new screen of corrugated iron, which is probably lighter than the solid screens of the same strength, as it requires no stay to keep it in shape.

No. 2178.—In Fig. 33 an illustration is given of Lewis's Patent Potato Digger, exhibited by *Messrs. Powell Brothers and*

Whittaker. In consequence of an omission to enter this as a "New Implement," the attention of the Judges was not drawn to it in time to test it in any way in the field, but they were very favourably impressed with the apparent merits of its design and construction. The fork-wheel is slightly conical in shape, so that the forks are a little advanced to work under the ridge; the top of the ridge thus falls behind the machine, instead of being thrown on one side with the potatoes and the rest of the soil. There is a saving of power in this, and the potatoes are

Fig. 33.—*Lewis's Patent Potato Digger*, No. 2178.

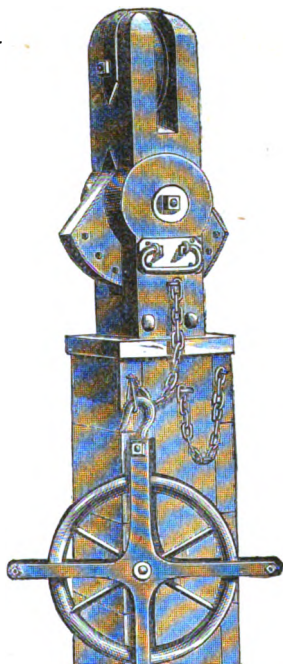


less liable to be covered. The wheel is constructed to work with 6, 8, or 12 forks, and can be set forwards or backwards to suit heavy or light soil; the angle at which it works can be readily adjusted by raising the front end of the spindle. The speed is gained by spur and bevel wheels. The Digger is provided with a separating wheel made of wood, instead of a cratch, to stop the potatoes without bruising them, and allow the soil to fall through. The separating wheel does not touch the ground, but it revolves freely when struck by the potatoes or by the earth; and is said so thoroughly to prevent the tubers from being covered, that it can dig one ridge after another without burying those first unearthed. It is fitted with a pole which prevents the machine from running askew and cutting the potatoes on one side of the ridge.

Fig. 34 illustrates *Mr. J. W. Porrett's* patent Sack Hoist, No. 2679, a useful contrivance for loading and unloading at

barns and granaries. The hoist consists of a socket, four square, which is let into the ground, and a post that fits into it, and is furnished with a movable head for meeting the load at any angle. The illustration shows the post standing in the socket. The head that contains the pulley is free to turn upon the bolt that passes through the upper part of the post. The pulley can be fixed to suit the lead of the horse by means of the quadrant and pin. A single post and block will serve for any number of sockets that it may be desirable to insert in different parts of the yards or buildings. The price, 5*l.* 5*s.*, includes the gin and a rope, and a greater length of post and socket than is shown in the illustration.

Fig. 34.—View of Mr. J. W. Porrett's Sack Hoist, No. 2679.



No. 2693, Messrs. J. Richardson and Son's Seed Dressing Machine for hand-power, comprises a blower fitted with regulating slides, a riddle with a riddling surface 5 feet by 2 feet, and two other screens, one of them with the same amount of surface, and the other smaller and rotary, with an independent motion. The seeds are fed from the hopper by a fluted roller; the feed, regulated at will by a slide on the hopper, falls first upon the rotary screen which is hung on chains immediately under the blower, and takes off the roughest material from the seeds; the next riddle removes large seeds like goose grass, and the lower shaker takes out hair grass, sand, &c. A clean sample is thus obtained at one operation.

No. 2694 is a Potato Sorting Machine by the same exhibitors, of great simplicity. It consists of a strong frame, inside of which is suspended on chains a shaker containing three riddles. The shaker is worked on the rotary principle by means of two cranks, one on each side, driven off the main axle by bevel wheels. Two of the riddles are changeable to suit the different kinds of potatoes. This machine makes three samples of potatoes.

A still simpler machine, for making two samples only, was exhibited by Mr. H. Cooch, No. 2307, in which a single riddle is hung on chains and agitated by hand.

Messrs. J. H. Peck and Co. exhibited a stretcher for ambulance work, that excited much interest, especially among many local visitors not unacquainted with accidents that occur too often in manufacturing districts and in collieries. Although it was naturally observed that such an appliance is more likely to be wanted in factories than on farms, we had sad evidence before the week was out of its utility in the Showyard. During the parade of horses, and shortly before the arrival of the Prince of Wales, a young man, standing on one of the barriers, slipped and was very much injured by the post beneath him. The stretcher was sent for, and it enabled the wounded man to be carried off at once to the Royal Infirmary, where he died on Saturday, July 18th.

The stretcher is made of steel and canvas, and has an adjustable head-rest. The sufferer is in contact with the canvas only, and this can very readily be slipped off and washed. Although fully large enough to carry a man, it can be wrapped up for storage into a parcel 5 feet 9 inches by 3 inches by 4 inches, weighing 30 lbs. Four side-straps with spiral springs are provided, and by means of these the stretcher can be slung in any ordinary cart, and the patient is thus carried without jolting.

Passing from this excellent provision for calamities, that happily are not frequent upon farms, another new implement presents itself, specially fitted for times of prosperity that of late years have been still more infrequent with our farmers. *Mr. John Port, of Ancoats, Manchester*, exhibited his new Round Bolt Safe, of solid iron and steel, weighing upwards of 2 tons. The body and door are $2\frac{1}{2}$ inches thick. Upon turning the key a series of round bolts, each $1\frac{3}{8}$ inches diameter, are shot out on all sides. When we add that the price is 200*l.*, it will be clear that in days of agricultural depression, when in every country town banks are found for the accommodation of the happy men who have cash to dispose of, this can hardly be called an agricultural implement, whatever it might have been in the piping times of Ready Money Jack.

The use of peat moss for litter has rapidly increased since it was imported from Germany, conveniently broken down and packed in bales. The German litter was shown at Stand No. 181, and quoted at 1*l.* 12*s.* per ton in Hull; when the cost of railway carriage is added to this, the price is too high for it to replace straw that may be sold off a farm. There are cases, however, as with a horse that eats his bedding, when moss-litter might be useful even on a farm. Peat for litter is now prepared in Cheshire and in other places at a lower price than the foreign litter, but it is sent out in small cakes or turves that require to be broken before they can be used for the stable.

Messrs. P. H. Bracher and Co. showed three implements, Nos. 3361–3363, for Peat Breaking, at a cost of 3*l.* 10*s.* for one that can be worked by a lad, 10*l.* for a double-action machine to be worked by two men, and 20*l.* for one suitable for manufacturers of peat-litter for sale. These peat-breakers are like cake-crushers in general arrangement; but in place of the rollers for cake-crushing they are furnished with two square spindles, set parallel, and fitted with long curved teeth, which seize the turf and tear it to pieces. A wrought-iron grid is placed immediately under the spindles. Each tooth in its revolution passes between teeth on the opposite spindle, and then between two of the bars of the grid. The machines were tried with some Cheshire peat of average toughness, and dealt with it in a satisfactory manner.

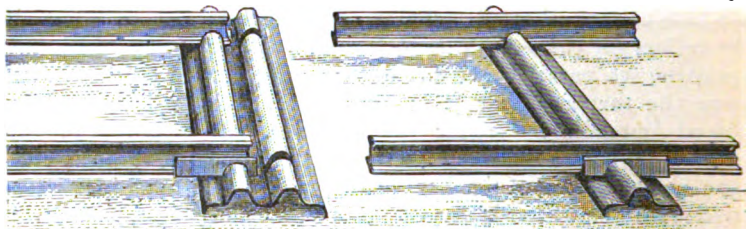
The new Vertical Boiler, No. 4123, manufactured by *Messrs. Coles and Matthews*, presents a refinement in construction, on the merits of which agricultural Judges can hardly venture to express an opinion. The chief feature in this boiler is the employment of a deflecting cone placed over the upper orifices of the quadrant-shaped tubes which extend from the sides to the crown of the fire-box. It was found, as the result of experiments with vertical boilers, such as these, that the water was violently ejected from the tubes and mixed with the steam; but that when the conical protector was placed over the tubes, it prevented the water from entering the steam-space outside the cone.

No. 4129, *Messrs. R. Hornsby and Sons* “LM” Two-Wheel Ridging and Moulding Plough was exhibited, with a new double wing share and skeith coulter for cutting ant-hills. The disc of the skeith coulter cuts through the centre of the hill; the wing share, 21 inches wide, severs it from the ground; and the double mould-boards split it open, and throw it out on either side. The plough can also be fitted for subsoiling, hoeing, potato-raising, or single-furrow ploughing; the share and skeith for ant-hill cutting cost 12*s.* extra,—a moderate price for appliances that will be of great service in many parks that are infested by these troublesome insects.

No. 4130 is the Draining Plough previously described. No. 4131 is a new Iron Double Furrow Digging Plough, “DGD,” with short abrupt breasts, for pulverising the land in summer fallow work, similar in construction to their “CD” Single Furrow Digging Plough. Each breast is fitted with an adjustable steel rubber, or levelling plate, for equalising the top surface of the broken furrow. A rest is fitted on the inner and lower part of the breast, which slides along the furrow sole, and keeps the plough steady in work.

A new system of portable railway, suitable for farm and other use, was exhibited by Messrs. J. and F. Howard. The sleepers are of steel plate, flanged and corrugated. The chairs for the

Fig. 35.—*Illustrations of Messrs. J. and F. Howard's Portable Railway.*



rails are formed in the corrugation of the sleeper, and the full strength of the corrugation being preserved at the part exposed to the tread of the draught animal, the exact gauge of the railway is well secured. No bolts or rivets are required, the only fastening being a metal key, slightly grooved on the one side to fit into the cheeks of the chair when the key is driven home. At the junction of the rails double sleepers are used, as shown in Fig. 35, and no fish plates are required. It seems hardly possible to attain greater lightness or simplicity of parts, and consequent facility for laying and removing a railway, than in this system. It will probably have a wide use wherever the surface of the ground is sound enough for sleepers of this description.

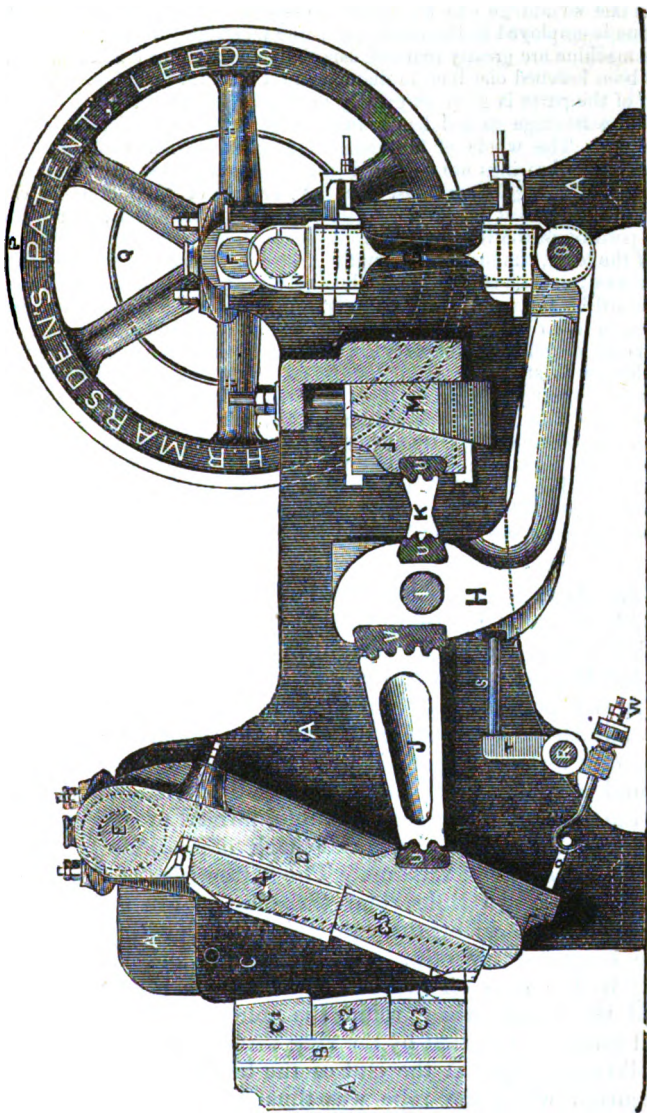
This firm have improved upon the Straw Trussing Machine for working in combination with a threshing-machine that obtained a silver medal in 1883 at York. The trusser is now fixed upon the rear of the frame of the threshing-machine, and requires no independent travelling wheels. The packing and binding mechanism is now so close to the shakers that the canvas aprons are no longer needed to conduct the straw to the collectors. In this form the trusser costs 35*l.*; as an independent implement it costs 45*l.*

No. 4545, *Mr. H. R. Marsden's* Stone-breaker, with Blake-Marsden's 1884 patent lever hand-hammer motion. This resembles the original Blake Stone-breaker in its broad outline, but is much improved in details.

It is driven in the usual way by a pulley, *q*, upon a crank, *r*, instead of an eccentric shaft. Upon this shaft a connecting-rod, *g*, is attached, and at the other lower end of the connecting-rod is spindled one end of a solid crucible-steel lever, the other end of which is fulcrumed to the main frame. As the connecting-rod, *g*, lifts up and down, it actuates the lever, *h*, in such a manner that the toggles, *j* and *k*, give the necessary motion to the swinging jaw, *d*, for breaking or crushing the material under treatment. One of the great advantages of this machine lies in the fact of there being a false

back, B, accurately planed and fixed to the frame, A, itself, against which the three fixed jaw faces, C¹, C², C³, readily bed, thus avoiding any degree of concussion, and also providing a means whereby these faces can be renewed

Fig. 36.—*Mr. H. R. Marsden's Improved Stone-breaker, No. 4545.*



and reversed in position in a few minutes, at any time, without the use of white metal for running up. The faces are fitted with surface strips on the backs, which also facilitate a dead bearing. The swinging jaw D is accurately

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3 c

planed, and the wearing faces, c^4 and c^5 , of this are fitted in the same manner as the others. By an ingenious contrivance, a positive drawback-motion, t , is imparted to the swing jaw, which takes no power to work, and which entirely dispenses with the old steel-embedded, india-rubber spring. This one advantage can hardly be over-estimated, as the full power of the engine is employed in the reduction of the material. The frictional parts in this machine are greatly reduced, especially the main or crank shaft, r , which has been lessened one inch in diameter in a medium machine. The adaptation of the parts is such as greatly to relieve the strain upon the machine, and the leverage gained has reduced the power required to drive by about one-half. The whole of the shafts and axles are made of best hammered steel. The bearings are pillowed throughout with brass bushes, accurately bored. The toggle cushions, u and v , are all of solid crucible cast-steel. One of the greatest advantages claimed for this machine is, that by altering the position of the teeth of the front toggle, j , up or down, upon the cushion v of the lever, the motion or length of stroke of the jaw can be increased or decreased, and the size of the product regulated in this manner. The motion, obtained by the use of the peculiarly formed toothed toggle and lever-cushion, gives an interrupted motion to the jaw to suit any kind of material; this also prevents clogging. For a certain position of the revolution of the fly-wheel, p , the jaw is stationary: the result is a sudden blow by the jaw upon the material, exactly similar to that of a man hitting the stone with a hand hammer. The result, it is claimed, is a much better sample of road metal than it is possible to get by any other machine, and less waste in chippings. The size of its mouth determines the size of the material each machine will take in. The No. 4545 machine measures 15 by 8 inches. A smaller machine, No. 4546, measures 8 by 6 inches at the mouth, and is provided with driving gear for working it by hand power.

Mr. Henry Yorath exhibited a new Clip-fork Elevator, No. 5228, which is an improvement upon the implement that was exhibited by *Mr. W. T. Wright* in 1872 at Cardiff, and described in the Report of that Show.

A rick pole, held by three guy ropes, carries a boom that can be adjusted to any height; upon the boom are two pulleys; the clip fork is suspended by a rope passing over these pulleys, round a snatch-block at the foot of the pole, and then attached to the horse. The fork is double, formed of two curved three-pronged forks turned towards each other, and fastened by a stud like a pair of scissors. The extremities of the handles are attached to two links, and these again are attached at their upper ends to a ring through which the elevating rope passes to the centre of the clip. As soon as the fork is thrust into the hay by the man on the cart, the pitch is raised by the horse, and the boom swings round the pole and over the stack. The old fork was emptied by the ring through which the rope passes striking a tappet at the end of the boom. The sudden jar that occurred when the rope was thus suddenly stopped was then stated to be very objectionable. This objection has now been removed by adding three small pulleys to the upper frame of the clip forks, and passing through them a check cord in such

a manner that when the cord is pulled the fork is opened and unloaded at any point of the sweep of the boom.

Having briefly described the leading novelties that attracted the attention of the Judges of the Implements at Preston, it only remains for me to express our grateful appreciation of the valuable help we received in questions of mechanics from Mr. W. E. Rich and Mr. F. S. Courtney, and our thanks to Sir John H. Thorold, the Steward who chiefly attended our branch of the Implement Department, for his most efficient help and unvarying kindness.

Royal Agricultural Society of England.

1885.

President.

SIR MASSEY LOPES, BART., M.P.

Trustees.

Year when Elected.	
1879	H.R.H. THE PRINCE OF WALES, K.G., <i>Marlborough House, Pall Mall, S.W.</i>
1855	AOLAND, SIR THOMAS DYKE, Bart., M.P., <i>Killerton, Exeter, Devonshire.</i>
1857	BRIDPORT, General Viscount, <i>Cricket St. Thomas, Chard, Somersetshire.</i>
1861	DENT, J. D., <i>Ribston Hall, Wetherby, Yorkshire.</i>
1871	EGERTON (of Tatton) Lord, <i>Tatton Park, Knutsford, Cheshire.</i>
1868	KINGSOOTE, Col., C.B., <i>Kingscote, Wotton-under-Edge, Gloucestershire.</i>
1868	LICHFIELD, Earl of, <i>Shugborough, Staffordshire.</i>
1854	MACDONALD, SIR ARCHIBALD KEPPEL, Bt., <i>Woolmer Lodge, Liphook, Hants.</i>
1839	PORTMAN, Viscount, <i>Bryanston, Blandford, Dorset.</i>
1856	POWIS, Earl of, <i>Powis Castle, Welshpool, Montgomeryshire.</i>
1858	RUTLAND, Duke of, K.G., <i>Belvoir Castle (Leicestershire), Grantham.</i>
1861	WELLS, WILLIAM, <i>Holmewood (Huntingdonshire), Peterborough.</i>

Vice-Presidents.

1873	BEDFORD, Duke of, K.G., <i>Woburn Abbey, Bedfordshire.</i>
1861	CATHCART, Earl, <i>Thornton-le-Street, Thirsk, Yorkshire.</i>
1839	CHICHESTER, Earl of, <i>Stanner Park, Lewes, Sussex.</i>
1867	DEVONSHIRE, Duke of, K.G., <i>Holker Hall, Lancashire.</i>
1847	EVERSLEY, Viscount, <i>Heckfield Place, Winchfield, Hants.</i>
1848	GIBBS, SIR BRANDRETH, <i>Mossley House, Sinclair Road, West Kensington Park, W.</i>
1858	KERRISON, SIR EDWARD C., Bart., <i>Brome Hall, Soles, Suffolk.</i>
1872	LATHOM, Earl of, <i>Lathom Hall, Ormskirk, Lancashire.</i>
1848	LAWES, SIR JOHN BENNET, Bart., <i>Rothamsted, St. Albans, Herts.</i>
1852	RICHMOND AND GORDON, Duke of, K.G., <i>Goodwood, Chichester, Sussex.</i>
1874	SPENCER, Earl, K.G., <i>Althorp, Northamptonshire.</i>
1855	WYNN, SIR WATKIN WILLIAMS, Bart., M.P., <i>Wynnday, Buabon, Denbighshire.</i>

Other Members of Council.

1881	*ALLENDER, G. MANDER, <i>Solna, Roehampton, Surrey.</i>
1877	ARKWRIGHT, J. HUNGERFORD, <i>Hampton Court, Leominster, Herefordshire.</i>
1880	*ASHWORTH, ALFRED, <i>Tabley Grange, Knutsford, Cheshire.</i>
1875	*AYLMER, HUGH, <i>West Dereham, Stokes Ferry, Norfolk.</i>
1871	*BOWEN-JONES, J., <i>Enadon House, Montford Bridge, R.S.O., Salop.</i>
1874	*CHANDOS-POLE-GELL, H., <i>Hopton Hall, Wirksworth, Derbyshire.</i>
1884	CHAPLIN, HENRY, M.P., <i>Blankney Hall, Lincoln.</i>
1883	CLAY, CHARLES, <i>Walton Grange, Wakefield, Yorkshire.</i>
1883	*COKE, HON. EDWARD K. W., <i>Longford Hall, Derbyshire.</i>
1885	*COVENTRY, Earl of, <i>Croome Court, Severn Stoke, Worcestershire.</i>
1882	*COXON, JOHN, <i>Freeford Farm, Lichfield, Staffordshire.</i>
1880	DEUCE, JOSEPH, <i>Eynsham, Oxford.</i>
1882	EMLYN, Viscount, M.P., <i>Golden Grove, Carmarthen, S. Wales.</i>
1876	*FEVERSHAM, Earl of, <i>Duncombe Park, Helmsley, Yorkshire.</i>

* Those Members of the Council whose names are prefixed by an asterisk retire by rotation in July, but are eligible for re-election in May.

List of Officers.

Year when Elected.	
1879	FOSTER, SAMUEL P., <i>Killhow, Carlisle, Cumberland.</i>
1875	FRANKISH, WILLIAM, <i>Limber Magna, Ulooby, Lincolnshire.</i>
1881	GILEBY, WALTER, <i>Elsenham Hall, Essex.</i>
1879	*GORRINGE, HUGH, <i>Kingston-by-Sea, Brighton, Sussex.</i>
1874	HENNELY, JOHN, <i>Shelton, Newark, Notts.</i>
1876	*HOWARD, CHARLES, <i>Biddenham, Bedford.</i>
1878	HOWARD, JAMES, M.P., <i>Clapham Park, Bedfordshire.</i>
1883	JERSEY, Earl of, <i>Middleton Park, Bicester, Oxfordshire.</i>
1869	*LEEDS, ROBERT, <i>Kewick Old Hall, Norwich.</i>
1881	*LITTLE, HERBERT J., <i>Coldham Hall, Wisbech, Cambridgeshire.</i>
1865	*LOPES, SIR MASSY, Bart., M.P., <i>Maristons, Roborough, Devon.</i>
1874	*MARTIN, JOSEPH, <i>Highfield House, Littleport, Isle of Ely, Cambridgeshire.</i>
1884	*MILLER, THOMAS H., <i>Singleton Park, Poulton-le-Fylde, Lancashire.</i>
1880	MOORETON, LORD, M.P., <i>Tortworth Court, Falfield, B.S.O., Gloucestershire.</i>
1879	NEVILLE, ROBERT, <i>Butleigh Court, Glastonbury, Somersetshire.</i>
1857	*PAIN, THOMAS, <i>Audleys Wood, Basingstoke, Hants.</i>
1881	*PARKER, Hon. ORCIL T., <i>Eccleston, Chester.</i>
1861	RANDALL, CHARLES, <i>Chadbury, Evesham, Worcestershire.</i>
1875	*RANSOME, ROBERT CHARLES, <i>Ipswich, Suffolk.</i>
1867	*RAVENSWORTH, Earl of, <i>Raensworth Castle, Gateshead, Durham.</i>
1871	RAWLINGS, JAMES, <i>Bulbridge, Wilton, Salisbury, Wilts.</i>
1869	*RIDLEY, Sir M. WHITE, Bart., M.P., <i>Blagdon, Cramlington, Northumberland.</i>
1875	*RUSSELL, ROBERT, <i>Horton Court Lodge, Dartford, Kent.</i>
1874	SANDAY, GEORGE H., <i>Langdale Lodge, Atkins Rd., Clapham Park, Surrey.</i>
1878	SHERATON, WILLIAM, <i>Broom House, Elmsmore, Salop.</i>
1882	STAFFORD, Marquis of, M.P., <i>Trentham Hall, Stoke-upon-Trent, Staffs.</i>
1875	STRATTON, RICHARD, <i>The Duffryn, Newport, Monmouthshire.</i>
1883	SUTTON, MARTIN J., <i>Kidmore, Caversham, Reading, Berkshire.</i>
1881	THEOBOLD, Sir JOHN H., Bart., <i>Syston Park, Grantham, Lincolnshire.</i>
1884	VIVIAN, Sir H. HUSSEY, Bart., M.P., <i>Park Wern, Swansea, S. Wales.</i>
1871	*WAKEFIELD, WILLIAM H., <i>Sedgwick, Kendal, Westmoreland.</i>
1882	WARREN, REGINALD AUGUSTUS, <i>Preston Place, Worthing, Sussex.</i>
1870	WHITEHEAD, CHARLES, <i>Barming House, Maidstone, Kent.</i>
1865	*WILSON, JACOB, <i>Chillingham Barns, Belford, Northumberland.</i>
1878	WIEB, GEORGE, <i>Woodcote, Warwick.</i>

Secretary and Editor.

H. M. JENKINS, 12, *Hanover Square, London, W.*

Consulting Chemist—Dr. J. AUGUSTUS VOELCKER, 12, *Hanover Square, W.*

Consulting Botanist—W. CARRUTHERS, F.R.S., F.L.S., *Central House, Central Hill, Norwood, S.E.*

Honorary Consulting Entomologist—Miss E. A. ORMEBOD, F.R.Met.Soc., *Dunster Lodge, Spring Grove, Isleworth.*

Consulting Veterinary Surgeon—PROFESSOR JAMES BEART SIMONDS, *St. John's Villa, Ryde, Isle of Wight.*

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* Those Members of the Council whose names are prefixed by an asterisk retire by rotation in July, but are eligible for re-election in May.

STANDING COMMITTEES FOR 1885.**Finance Committee.**

KINGSNOTE, Colonel (Chairman).
BRIDPORT, General Viscount.
RIDLEY, Sir M. WHITE, Bt.

FRANKISH, W.
RANDALL, CHARLES.
WILSON, JACOB.

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THE PRESIDENT.
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GIBBS, Sir BRANDRETH.
RANDALL, C.
WILSON, JACOB.

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THOROLD, Sir J. H., Bt.
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CHANDOS-POLE-GELL, H.
DENT, J. D.
FRANKISH, W.

HEMSLEY, J.
HOWARD, J.
LITTLE, H. J.
RANSOME, R. C.
WELLS, W.
WHITEHEAD, CHARLES.

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FLAMING, GEORGE.
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ROBERTSON, Professor.
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NEVILLE, R.
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PRESTON, TOWN CLERK OF
RANDELL, CHARLES.
SANDAY, G. H.
SHERATON, W.
STARKIE, Colonel LE G.
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WAKEFIELD, W. H.
WELLS, W.
WHITEHEAD, CHARLES.
WILSON, JACOB.
WISE, GEO.
WOOD, Rev. L. C.

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ASHWORTH, A.
CLAY, CHARLES.
FRANKISH, W.
HEMSLEY, J.

HOWARD, C.
RANSOME, R. C.
SANDAY, G. H.
WILSON, JACOB.

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CATHCART, Earl (Chair-
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EMLYN, Viscount.

PARKER, Hon. C. T.
RIDLEY, Sir M. W.
CHANDOS-POLE-GELL, H.

CLAY, C.
LITTLE, H. J.

And the Chairmen of the Standing Committees.

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BOWEN-JONES, J.
CARRUTHERS, W.
DENT, J. D.

FOSTER, S. P.
KINGSCOTE, Colonel.
LITTLE, H. J.

Baird Committee.

PARKER, Hon. C. T.
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BRIDPORT, Gen. Viscount.
JERSEY, Earl of.
EGGESTON, Lord.

MORETON, Lord.
THOROLD, Sir J. H., Bt.
ALLENDER, G. M.
ARKWRIGHT, J. H.
BOWEN-JONES, J.

CHANDOS-POLE-GELL, H.
KINGSCOTE, Colonel.
NEVILLE, R.
SHERATON, W.

Cattle Plague Committee.

THE WHOLE COUNCIL.

* * The PRESIDENT, TRUSTEES, and VICE-PRESIDENTS are Members *ex officio* of all Committees.

Royal Agricultural Society of England.

GENERAL MEETING,

12, HANOVER SQUARE, THURSDAY, DECEMBER 11TH, 1884.

REPORT OF THE COUNCIL.

THE Council have to congratulate the Society upon the continued increase in the number of its Members. During the present year the changes in the list have been as follows:— 3 Governors and 1098 Members have been elected; 1 Member has qualified as a Governor; the deaths of 7 Governors and 112 Members have been reported; 200 Members have resigned; and 109 Members have been removed from the list by order of the Council.

The Society now consists of:—

73 Life Governors,
71 Annual Governors,
3281 Life Members,
5579 Annual Members,
20 Honorary Members,

making a total of 9024, and showing an increase of 672 during the year 1884.

In illustration of the recent increase in the number of Members of the Society the Council may usefully refer to the Report to the General Meeting held in December, 1874, when the total was 5982, so that during the last ten years the net increase has averaged 304 per annum.

The Council deplore the grievous loss which agriculture as well as the Society have so recently sustained by the death of

Dr. Voelcker, who had been the Consulting Chemist and Director of the Laboratory of the Society for more than a quarter of a century. It is largely owing to the confidence which agriculturists of all classes have reposed in his skill, knowledge, and judgment for so many years that the Chemical Department of the Society has acquired its present development and its high state of efficiency.

At the General Meeting in May, Sir H. Hussey Vivian, Bart., M.P., and Mr. Henry Chaplin, M.P., were elected Members of the Council to fill vacancies caused by the resignation of Col. Picton Turbervill and Sir R. Loyd Lindsay. Since then, the vacancy caused by the death of Mr. George Turner, of Isca, Pennsylvania, Exeter, has been filled by the election of Mr. T. H. Miller, of Singleton, Poulton-le-Fylde, Lancashire; and a more recent vacancy, caused by the resignation of Mr. Jabez Turner, of Horsington, Horncastle, Lincolnshire, is under the consideration of the Council.

The half-yearly statement of accounts to the 30th June last has been examined and certified by the auditors and accountants of the Society, and has been published in the 'Journal' for the information of the Members. The funded capital of the Society remains the same as at the Annual Meeting in May, namely, 25,880*l.* 4*s.* 4*d.* New Three per Cents, as the Finance Committee did not deem it expedient to adopt the Government scheme of conversion into Two-and-a-half or Two-and-three quarter per cents. The balance of the current account in the hands of the Society's Bankers on the 1st instant was 2421*l.* 7*s.* 5*d.*, and 3500*l.* remained on deposit. The Council have ordered that the Society's funded capital should be increased by the investment of 4000*l.* in the New Three per Cents.

The Shrewsbury Meeting was remarkably successful in every way, and, notwithstanding the expense of the very satisfactory Trials of Sheaf-binders, it has resulted in an addition of about 1500*l.* to the Society's funds. The Report on the Show of Live

Stock, written by Mr. Housman, and published in the last number of the 'Journal,' records accurately the leading features of that department of the Show, which were the large and excellent entries of Hereford Cattle and Shropshire Sheep.

The Report of the Farm-prize Competition in connection with the Shrewsbury Meeting, written by Mr. Coleman, of York, and published in the current number of the 'Journal,' contains accounts of profitable farming in that district, which are well worthy of perusal by Members of the Society.

The Council have decided that the Preston Meeting shall commence on Wednesday, July 15th, and close on the following Monday evening.

Prizes for the best-managed Farms in a defined district round Preston, including the Counties of Lancaster and Chester, have been offered in seven Classes by the Preston Local Committee, the Council of the Society, the Earl of Derby, and Mrs. Clifton; and the Council are glad to report that these offers have attracted forty-six entries, which is at least double the usual number. The Council have therefore appointed two sets of Judges, who have already made their first inspection.

Preston being situated within a comparatively small distance of the headquarters of several local breeds of Cattle and Sheep, the Stock Prize-sheet for the ensuing year has necessarily been arranged with a view to their adequate representation in the Showyard. The Society's Schedule of Prizes has been liberally supplemented by the Local Committee in Classes for Shire and Agricultural Horses, Hunters, Harness Horses, Hackneys and Roadsters, Shorthorns and Dairy Cattle, several Classes of Mountain Sheep, and Dairy Produce. In addition, the Corporation of Blackpool give Prizes for Shire and Agricultural Geldings and Fillies, and add to the Society's Prizes for Thoroughbred Stallions; the Shorthorn Society renews its offer of Champion Prizes for the best male and the best female Shorthorn in the Showyard; the Shire Horse Society has again offered a Prize for the best "Shire" Stallion in the Showyard; and the

Hereford Herd Book Society has repeated its offer of Prizes for Families of Hereford Cattle.

The Council have decided to offer Prizes for Cheese and Butter in several classes, as well as for Milch Cows giving a fixed minimum quantity of milk of a standard quality; and it is hoped that the competition for these Prizes will warrant the Council in continuing such additions to the Country-Meeting Prize-sheet.

The County of Lancaster being one of the most important poultry-keeping districts in the United Kingdom, a numerously signed memorial, asking the Council to include a Show of Poultry in the arrangements for the Preston Meeting, was presented by the Mayor. After due consideration the Council have decided again to try the experiment, notwithstanding the unfavourable time of the year for a Poultry Exhibition in which the Society's Shows are held; but the Prize-sheet has been arranged specially with the object of making such a Show beneficial to farmers as distinguished from fanciers.

Recognising the importance of encouraging improvements in harness suitable for farm-work, the Council have decided to offer Prizes for Harness, Gears, and Whippetrees in several classes for competition at Preston. They have also offered Prizes for the best packages suitable for the conveyance of Butter in large and small quantities.

With a view to the more efficient control of any future outbreak of Foot-and-mouth Disease, the Council resolved that in their opinion it is desirable that the Privy Council should issue such an Order, binding upon all Local Authorities in counties and boroughs in Great Britain, as may provide for the satisfactory isolation of all animals in infected places, and the disinfection of all persons and things which may have been in contact with the same, and so do away with the necessity of licences for the removal of cattle from the district of one Local Authority to another. The Council are glad to be able to state that the Foot-and-mouth Disease Order of November last regulates the

disinfection of attendants on infected animals, as well as of the premises in which the animals are kept, and the utensils, substances, and things that have been in contact with them.

The Sub-Committee of the Council appointed to consider the question of an investigation into the amount of Meat annually produced by the Live-stock of the United Kingdom had an interview and subsequent communications with the Lord President of the Council. Instructions have since been given that arrangements may be made in the form of Return, whereby it is hoped that information as to the numbers of Cattle, Sheep, and Swine respectively born on every farm, as well as those of all animals in each of these classes that have died from natural causes on the farm during the year dealt with in the Agricultural Returns, will be furnished by occupiers.

The plan of appointing Provincial Veterinary Surgeons to the Society, which was commenced in 1882, has been extended this year to every county in England and Wales, and the Council are glad to announce that in nearly every case the gentlemen selected have accepted the appointment. They trust that these appointments will encourage Members of the Society to have timely recourse to efficient Veterinary aid in cases of disease amongst their cattle, sheep, and pigs.

Professor Axe having concluded his investigation into the losses which have been sustained by Lincolnshire sheep-farmers in consequence of abortion in ewes and premature dropping of lambs, his final Report will be published in the next number of the 'Journal.'

The scientific departments of the Society continue to increase in activity and usefulness, owing partly to the greater demand for their assistance by Members of the Society, and partly to the investigations which are made by the Honorary Consulting Entomologist, the Consulting Chemist, and the Consulting Botanist respectively. Ten years ago, the number of samples sent to the Consulting Chemist during the year was 645, and it has this year been 1628. At the former period the Consulting

Botanist received so few samples, that their number was not worth recording ; but last year he received 508, and this year the number is 701. A similar expansion during the short period that her department has been organized has been reported from time to time by Miss Ormerod.

The Council desire to call the attention of Members of the Society to the Paper in the current number of the 'Journal,' by Sir J. B. Lawes and Dr. Gilbert, on the Continuous Growth of Wheat on the Experimental Plots at Rothamsted during the past twenty years, being a continuation of their Paper published in 1864, giving the results of continuous wheat-growing on the same plots during the previous twenty years. The conclusions drawn from the results of these experiments cannot fail to be of great practical value in their applicability to ordinary courses of farming.

The late Dr. Voelcker contributed to the current number of the 'Journal' a Paper on the Chemistry of Ensilage : and as the Duke of Bedford liberally erected five Silos at Woburn for experiments to be carried out under his superintendence, the Council still hope that our knowledge of the principles to be observed in making Silage will soon be more definite than it is at present. The President of the Society has offered a Prize of one hundred guineas for the best Silo in England or Wales in actual work during the winter of 1885-86. The conditions of this competition will be fixed by the Council, and will be announced as soon as possible.

The Centenary Meeting of the Highland and Agricultural Society of Scotland was held this year at Edinburgh ; and at the invitation of the Directors, the President, Mr. Dent, and Mr. Wells, with the Secretary, attended as representatives of this Society. The Council have expressed to the Directors of the Highland Society their appreciation of the invitation, and of the kindly welcome given to their President and representatives, and have heartily congratulated them on the very successful celebration of their hundredth anniversary.

Forty-six candidates were entered for examination for the Society's Junior Scholarships, from eight Schools, in addition to two "unattached" candidates. The result of the Examination is that the following candidates, arranged in order of merit, have qualified for Scholarships of 20*l.* each:—

Surrey County School	..	..	..	..	..	VINCENT W. LOW.
"	..	..	..	..	..	JOHN H. REEVES.
Northampton Grammar School	..	..	..	..	..	W. SCUDAMORE.
Surrey County School	..	..	..	..	..	G. S. MIDDLEMISS.
"	..	..	..	..	..	E. A. WHEELEY.
"	..	..	..	..	..	JOHN P. G. HILL.
Northampton Grammar School	..	..	..	..	..	A. S. BLACKWELL.
Surrey County School	..	..	..	..	..	H. E. DOWSE.
"	..	..	..	..	..	H. J. REEVES.
Ashburton Grammar School	..	..	..	..	..	W. R. KNOTT.
Pavenham School	..	..	..	..	..	A. A. GLOVER.

Of these successful candidates, the first ten will receive Scholarships if they comply with the Society's regulations, and the Council have ordered that a special certificate of qualification be sent to the eleventh on the list.

On the recommendation of their Education Committee, the Council have decided to apply a portion of the Educational Grant to the practical testing of the skill of Dairy-workers by an Examiner to be appointed by the Council.

By Order of the Council,

H. M. JENKINS.

Secretary.

Royal Agricultural Society of England.

JANUARY 1ST, 1885.

DISTRIBUTION OF MEMBERS OF THE SOCIETY AND OF MEMBERS OF COUNCIL.

DISTRICTS.	COUNTIES.	NUMBER OF MEMBERS.	NUMBER IN COUNCIL.	MEMBERS OF COUNCIL.
A.	BEDFORDSHIRE ..	123 ..	3	{ Duke of Bedford, K.G., v.p.; C. Howard; James Howard.
	BUCKINGHAMSHIRE	109		
	CAMBRIDGESHIRE ..	101 ..	2	H. J. Little; J. Martin.
	ESSEX	330 ..	1	W. Gilbey.
	HERTFORDSHIRE ..	158 ..	1	Sir J. B. Lawes, v.p.
	HUNTINGDONSHIRE ..	50 ..	1	W. Wells, t.
	MIDDLESEX	429 ..	1	Sir Brandreth Gibbs, v.p.
	NORFOLK	308 ..	3	{ H.R.H. the Prince of Wales, K.G., t.; Hugh Aylmer; Robert Leeds.
	OXFORDSHIRE ..	151 ..	2	Earl of Jersey; J. Druce.
	SUFFOLK	173 ..	2	{ Sir E. C. Kerrison, v.p.; R. C. Ransome.
		—1932	— 16	
B.	CUMBERLAND	186 ..	1	S. P. Foster.
	DURHAM	186 ..	1	Earl of Ravensworth.
	NORTHUMBERLAND ..	169 ..	2	{ Sir M. White Ridley; Jacob Wilson.
	WESTMORELAND ..	69 ..	1	W. H. Wakefield.
		— 610	— 5	
C.	DERBYSHIRE	222 ..	2	{ Hon. E. K. Coke; H. Chandos- Pole-Gell.
	LEICESTERSHIRE ..	94 ..	1	Duke of Rutland, t.
	LINCOLNSHIRE	271 ..	3	{ Sir J. H. Thorold; H. Chaplin; W. Frankish.
	NORTHAMPTONSHIRE	132 ..	1	Earl Spencer, v.p.
	NOTTINGHAMSHIRE ..	185 ..	1	J. Hemsley.
	RUTLAND	13 ..		
		— 917	— 8	

DISTRIBUTION OF MEMBERS OF THE SOCIETY—*continued.*

DISTRICTS.	COUNTIES.	NUMBER OF MEMBERS.	NUMBER IN COUNCIL.	MEMBERS OF COUNCIL.
D.	BERKSHIRE	168 ..	1	M. J. Sutton.
	CORNWALL	70		
	DEVONSHIRE	124 ..	2	{ Sir T. D. Acland, t.; Sir M. Lopes.
	DORSETSHIRE	81 ..	1	Viscount Portman, t.
	HAMPSHIRE	190 ..	3	{ Viscount Eversley, v.p.; Sir A. K. Macdonald, t.; T. Pain.
	KENT	441 ..	2	R. Russell; O. Whitehead.
	SOMERSETSHIRE	176 ..	2	Visct. Bridport, t.; R. Neville.
	SURREY	209 ..	2	G. M. Allender; G. H. Sanday.
	SUSSEX	242 ..	4	{ Duke of Richmond and Gordon, v.p.; Earl of Chichester, v.p.; H. Gorringe; R. A. Warren.
	WILTSHIRE	134 ..	1	J. Rawlence.
		—1835	—18	
E.	YORKSHIRE	679 ..	4	{ Earl Cathcart, v.p.; Earl of Feversham; O. Clay; J. D. Dent, t.
F.	GLOUCESTERSHIRE ..	224 ..	2	{ Lord Moreton; Col. Kingscote, t.
	HEREFORDSHIRE ..	148 ..	1	J. H. Arkwright.
	MONMOUTHSHIRE ..	41 ..	1	R. Stratton.
	SHROPSHIRE	570 ..	2	J. Bowen-Jones; W. Sheraton.
	STAFFORDSHIRE ..	270 ..	3	{ Earl of Lichfield, t.; Marquis of Stafford; J. Coxon.
	WARWICKSHIRE ..	211 ..	1	George Wise.
	WORCESTERSHIRE ..	194 ..	2	Earl of Coventry; O. Randell.
	SOUTH WALES ..	178 ..	2	{ Viscount Emlyn; Sir H. Hussey Vivian.
G.		—1836	—14	
	CHESHIRE	241 ..	3	{ Lord Egerton, t.; Hon. Cecil T. Parker; A. Ashworth.
	LANCASHIRE	337 ..	3	{ Duke of Devonshire, v.p.; Earl of Lathom, v.p.; T. H. Miller.
	NORTH WALES ..	238 ..	2	{ Earl of Powis, t.; Sir W. W. Wynn, v.p.
		—	8	
	SCOTLAND	138		
	IRELAND	120		
	CHANNEL ISLANDS ..	16		
	FOREIGN COUNTRIES ..	108		
	HONORARY MEMBERS ..	19		
	MEMBERS WITHOUT ADDRESSES ..	100		
		— 501		

ROYAL AGRICULTURAL

HALF-YEARLY CASH ACCOUNT

Dr.

		£	s.	d.	£	s.	d.
To Balance in hand, 1st July, 1884:—							
Bankers	3,075	10	5				
Secretary	47	7	6				
				3,122	17	11	
At Deposit				6,900	0	0	
							6,622 17 11
To Income:—							
Dividends on Stock				380	2	2	
Interest on Deposit				59	18	0	
Subscriptions:—							
Governor's Life Composition	50	0	0				
Governors' Annual	10	0	0				
Members' Life-Compositions	755	0	0				
Members' Annual	1,031	1	0				
				1,846	1	0	
Journal:—							
Sales	92	18	9				
Advertisements	150	15	0				
				249	13	9	
Chemical:—							
Laboratory Fees.. .. .				226	7	6	
Farm Inspection:—							
Prizes given by Shrewsbury Local Committee ..	250	0	0				
Entry Fees for 1885	31	0	0				
				311	0	0	
Sundries:—							
Sir Massey Lopes' Special Prize, not yet awarded				105	0	0	
York Meeting.. .. .				11	0	10	
Total Income							3,189 3 4
To Shrewsbury Meeting							15,440 13 1
							235,263 16 4

BALANCE-SHEET,

		£	s.	d.	£	s.	d.
To Capital:—							
Surplus, 30th June, 1884		33,900	7	5			
Less surplus of Expenditure over Income during the Half-year, viz.:—							
Expenditure	4,271	2	10				
Income	3,189	3	4				
				1,081	19	6	
							32,818 7 11
Deduct half-year's interest and depreciation on Country Meeting } Plant							157 9 9
To Shrewsbury Meeting:—							32,660 15 2
Excess of Receipts over Expenditure							1,015 4 9
							234,576 2 11

QUILTER, BALL, CROSBIE, GLEGG & WELTON, Accountants.

SOCIETY OF ENGLAND.

FROM 1ST JULY TO 31ST DECEMBER, 1884.

UR.

By Expenditure:—	£	s.	d.	£	s.	d.	£	s.	d.
Establishment:—									
Salaries, Wages, &c.	830	0	0						
House:—Rent, Taxes, Repairs, &c.	624	0	2						
Office:—Printing, Postage, Stationery, &c.	296	9	1						
				1,740	9	3			
Journal:—									
Printing and Stitching	685	16	6						
Printing Advertisements	60	12	6						
Postage and Delivery	220	0	0						
Literary Contributions	92	0	0						
Woodcuts	25	16	0						
Advertising	36	3	7						
				1,120	8	7			
Chemical:—									
Salaries	459	1	3						
Apparatus and Chemicals	50	4	1						
Petty Payments	18	7	0						
				527	12	4			
Botanical:—									
Consulting Botanist's Salary				50	0	0			
Education:—									
Printing and Advertising	71	2	3						
Scholarships	200	0	0						
Fees to Examiners	15	15	0						
				236	17	3			
Farm Inspection:—									
Prizes	280	0	0						
Judges	220	4	7						
Advertising	88	12	4						
				588	16	11			
Sundries				6	18	6			
Total Expenditure..							4,271	2	10
By Country Meeting Plant							63	6	1
By Stock:—Purchase of £4005 New 3 per Cents.							4,000	0	0
By Shrewsbury Meeting				14,914	4	0			
By Preston Meeting and new Plant				1,232	14	11			
							16,146	18	11
By Balance in hand, 31st December:—									
Bankers				768	2	5			
Secretary				63	4	1			
							771	6	6
							£26,252	14	4

31ST DECEMBER, 1884.

ASSETS.			£	s.	d.	£	s.	d.
By Cash in hand			771	6	6			
By New 3 per Cent. Stock 29,885l. 4s. 4d. cost*			29,177	17	1			
By Books and Furniture in Society's House			1,461	17	6			
By Country Meeting Plant			1,942	6	11			
						23,343	8	0
At Debt of Preston Meeting and on account of new Plant..						1,232	14	11
* Value at 99½ = 29,661l. 1s. 4d.								
<i>Mem.</i> —The above Assets are exclusive of the amount recoverable in respect of arrears of Subscriptions to 31st December, 1884, which at that date amounted to 898l.								
						£34,576	2	11

Examined, audited, and found correct, this 2nd day of March, 1885.

FRANCIS SHERBORN,
A. H. JOHNSON,
C. GAY ROBERTS, } Auditors on behalf of the Society.

RECEIPTS.

	£	s.	d.
Subscription from Shrewsbury	2,000	0	0
Admissions to Show Yard by Payment	7,004	11	6
Admissions by Season Tickets	237	4	8
Admissions to Stand at Horse Ring	329	14	0
Admissions to Dairy	44	11	6
Sale of Catalogues	767	10	0
Sale of Guide to Dairy	5	17	10
Entries in Implement Catalogue	325	0	0
Advertisements in Stock Catalogues	275	12	6
Implement Exhibitors' Payment for Shedding	4,225	15	6
Non-Members' Fees for entry of Implements	190	0	0
Fees for entry of Live-Stock, &c.	532	15	0
Fees for Horse Boxes and Stalls	360	0	0
Premium for Supply of Refreshments	320	0	0
Premium for Cloak Rooms, Lavatories, &c.	60	0	0
Fines for Non-Exhibition of Live-Stock.	168	10	0
Fines for Implements	25	0	0
Reference Number Fines	3	10	0
Sales of Butter and Milk	15	1	10
Sales of Fodder and Manure	20	0	1

216,859 3 6

EXPENDITURE.

SHOW YARD WORKS:—

	s	s.	d.	s	s.	d.
By Timber and Joinery	4,649	2	7			
„ Ironmongery, 115 <i>l.</i> 19 <i>s.</i> 0 <i>d.</i> ; Hurdles, 162 <i>l.</i> 10 <i>s.</i> 0 <i>d.</i>	278	9	0			
„ Bricks and Cement and Bricklayers	62	4	3			
„ Paints, Oils, Glass, &c.	63	9	8			
„ Canvas, Felt, Baise, &c.	1,412	11	1			
„ Railway Charges, &c., 279 <i>l.</i> 7 <i>s.</i> 11 <i>d.</i> ; Horse Hire, 114 <i>l.</i> 7 <i>s.</i> 6 <i>d.</i>	393	15	7			
„ Coals, 14 <i>l.</i> 14 <i>s.</i> 6 <i>d.</i> ; Insurance, 30 <i>l.</i> 9 <i>s.</i>	45	3	6			
„ Postage and Stationery, 31 <i>l.</i> 6 <i>s.</i> 1 <i>d.</i> ; Hire of Furniture, 11 <i>l.</i> 16 <i>s.</i> 2 <i>d.</i>	43	2	3			
„ Sundries	18	0	4			
„ Wages	1,708	11	7			
„ Superintendent of Works—Salary and Expenses	524	12	7			
„ Depreciation of Plant	322	12	3			
				9,521	14	8

Per Contra:—

By Sale of Materials	3,399	8	2			
„ Work for Exhibitors and Purveyors	1,571	19	7			
				4,971	7	9
				4,550	6	11

Judges' Fees.—Implements, 130 <i>l.</i> 10 <i>s.</i> ; Stock, 373 <i>l.</i> 4 <i>s.</i> 6 <i>d.</i>	503	14	6			
Inspectors' Fees.—Veterinary, 80 <i>l.</i> 10 <i>s.</i> ; Shearing, 22 <i>l.</i> 14 <i>s.</i> 4 <i>d.</i> ; Veterinary Assistants, 24 <i>l.</i> 6 <i>s.</i>	127	10	4			
Police.—Metropolitan, 421 <i>l.</i> 15 <i>s.</i> 9 <i>d.</i> ; Local, 6 <i>l.</i> 4 <i>s.</i>	427	19	9			
Clerks and Assistants.—Bankers', 37 <i>l.</i> ; Secretary's and Stewards', 112 <i>l.</i> 15 <i>s.</i>	149	15	0			
Foremen and Assistant-Foremen	134	10	4			
Yardmen, Grooms, Foddermen, Labourers, &c., 283 <i>l.</i> 18 <i>s.</i> 4 <i>d.</i> ; Labourers at Trial Fields, 54 <i>l.</i> 2 <i>s.</i>	340	0	4			
Superintendent of Turnstiles, Money Changer, and Money Takers, 63 <i>l.</i> 4 <i>s.</i> ; Doorkeepers, 46 <i>l.</i> 12 <i>s.</i>	109	16	0			
Stewards' Expenses, 202 <i>l.</i> 15 <i>s.</i> 3 <i>d.</i> ; Assistant-Stewards, 88 <i>l.</i> 6 <i>s.</i>	291	1	3			
Lodgings and Hotel Expenses for Stewards, Implement Judges, and other Officials	238	14	6			
Refreshments and Allowances	89	3	5			
Catalogues.—Implements, 304 <i>l.</i> 12 <i>s.</i> 10 <i>d.</i> ; Stock, 323 <i>l.</i> 4 <i>s.</i> ; Plan of Yard, 22 <i>l.</i> 2 <i>s.</i> ; Awards, 44 <i>l.</i> ; } Guide to Dairy, 12 <i>l.</i> 5 <i>s.</i> ; Packing and Carriage, 9 <i>l.</i> 14 <i>s.</i> ; Commission on Sales, 49 <i>l.</i> 11 <i>s.</i> 6 <i>d.</i>	765	10	4			
Printing, 831 <i>l.</i> 5 <i>s.</i> 4 <i>d.</i> ; Advertising and Bill Posting, 593 <i>l.</i> 2 <i>s.</i> 3 <i>d.</i>	1,424	7	7			
Postage, Telegrams, Stationery, Carriage, &c.	136	9	3			
Engineering.—Engineers, 137 <i>l.</i> ; Assistants and Labourers, 19 <i>l.</i> 10 <i>s.</i> 1 <i>d.</i> ; Insurance of Plant, } 7 <i>l.</i> 9 <i>s.</i> 3 <i>d.</i> ; Sundries, 1 <i>l.</i> 19 <i>s.</i> 5 <i>d.</i>	165	18	9			
Dairy.—Milk, 70 <i>l.</i> ; Dairymaids and Assistants, 114 <i>l.</i> 5 <i>s.</i> 3 <i>d.</i> ; Hire of Engines, 9 <i>l.</i> 5 <i>s.</i> 6 <i>d.</i> ; Horse } Power, 8 <i>l.</i> 8 <i>s.</i> ; Fixing Separator, 9 <i>l.</i> 6 <i>s.</i> ; Utensils, 16 <i>l.</i> 17 <i>s.</i> 3 <i>d.</i> , and Carriage, 11 <i>l.</i> 3 <i>s.</i> 6 <i>d.</i> ; } Blocks and Ropes, 1 <i>l.</i> 6 <i>s.</i> ; Ice, 18 <i>l.</i> 16 <i>s.</i> 4 <i>d.</i>	259	7	10			
Trials.—Trial-fields, 31 <i>l.</i> 10 <i>s.</i> ; Gorse, 30 <i>l.</i> 17 <i>s.</i> 6 <i>d.</i> ; Grass, 18 <i>l.</i> ; Cutting Oats, 3 <i>l.</i> 7 <i>s.</i> 4 <i>d.</i> ; Hire of } Reaper, 5 <i>l.</i> ; Hire of Tent, 15 <i>l.</i> ; Surveyor, 10 <i>l.</i> 10 <i>s.</i> ; Plans of Fields, 13 <i>l.</i> 13 <i>s.</i> ; Miscellaneous, } 4 <i>l.</i> 1 <i>s.</i> 10 <i>d.</i>	131	19	8			
Horse and Carriage Hire, 114 <i>l.</i> 6 <i>s.</i> 6 <i>d.</i> ; Trials, 80 <i>l.</i> 11 <i>s.</i> 10 <i>d.</i>	194	18	4			
Journeys previous to Show, 13 <i>l.</i> 11 <i>s.</i> 6 <i>d.</i> ; Official Staff, 27 <i>l.</i> 10 <i>s.</i> 11 <i>d.</i>	41	2	5			
Hay, 180 <i>l.</i> 7 <i>s.</i> 6 <i>d.</i> ; Straw, 393 <i>l.</i> 9 <i>s.</i> ; Green Food, 177 <i>l.</i> 16 <i>s.</i> 6 <i>d.</i> ; Agreements, 2 <i>l.</i> 12 <i>s.</i>	764	5	0			
Fire Engines, 52 <i>l.</i> 7 <i>s.</i> 3 <i>d.</i> ; Telegraph Extension, 1 <i>l.</i> 10 <i>s.</i> 7 <i>d.</i> ; Hire of Chairs, 18 <i>l.</i> 10 <i>s.</i>	72	8	3			
Boys, 8 <i>l.</i> 10 <i>s.</i> ; Caps, Blouses, &c., 20 <i>l.</i> 2 <i>s.</i> 2 <i>d.</i> ; Veterinary Medicines, 1 <i>l.</i> 16 <i>s.</i> 5 <i>d.</i>	30	8	7			
Tan, 5 <i>l.</i> 1 <i>s.</i> 5 <i>d.</i> ; Mowing Yard, 4 <i>l.</i> 14 <i>s.</i> ; Cartage, 7 <i>l.</i> 14 <i>s.</i> 7 <i>d.</i>	17	10	0			
Newspapers, Corn, Coals, Brushes, Soap, and Sundries	20	13	7			
Bee Exhibition	30	0	0			
Rosettes, 18 <i>l.</i> 6 <i>s.</i> 10 <i>d.</i> ; Medals, 3 <i>l.</i> 12 <i>s.</i>	21	18	10			
Prizes: Stock, 337 <i>l.</i> 5 <i>s.</i> ; Implements, 150 <i>l.</i>	3,828	0	0			
				214,557	10	9
By Balance				2,300	12	8
				216,858	3	5

* Exclusive of 477*l.* given by the Shrewsbury Local Committee, 200*l.* by the Shropshire and West Midland Agricultural Society, 90*l.* by the Welshpool Local Committee, 30*l.* by the Hereford Herd Book Society, 145*l.* by a Committee of Hereford Breeders, 105*l.* by Shropshire Breeders, 100*l.* by the Shorthorn Society, and 25*l.* by the Shire Horse Society.

MEMORANDA.

ADDRESSES OF LETTERS.—The Society's office being situated in the postal district designated by the letter W, Members, in their correspondence with the Secretary, are requested to subjoin that letter to the usual address.

GENERAL MEETING in London, May 22nd, 1885, at 12 o'clock.

ANNUAL EXCURSION to Woburn, Thursday, June 4th. For particulars apply to the Secretary previous to June 1st, after which no tickets will be issued.

MEETING at Preston, July 15th to 20th (Sunday excepted), 1885.

MONTHLY COUNCIL (for transaction of business), at 12 o'clock on the first Wednesday in every month, excepting January, September, and October: open only to Members of Council and Governors of the Society.

ADJOURNMENTS.—The Council adjourn over Passion and Easter weeks, when those weeks do not include the first Wednesday of the month; from the first Wednesday in August to the first Wednesday in November; and from the first Wednesday in December to the first Wednesday in February.

OFFICE HOURS.—10 to 4. On Saturdays, 10 to 2.

DISEASES OF CATTLE, SHEEP, AND PIGS.—Members have the privilege of applying to the Veterinary Committee of the Society, and of sending animals to the Royal Veterinary College, Camden Town, N.W.—(A statement of these privileges will be found on page xxi in this Appendix.)

CHEMICAL ANALYSIS.—The privileges of Chemical Analysis enjoyed by Members of the Society will be found stated in this Appendix (page xxiii).

BOTANICAL AND ENTOMOLOGICAL PRIVILEGES.—The Botanical and Entomological Privileges enjoyed by Members of the Society will be found stated in this Appendix (page xxvi).

SUBSCRIPTIONS.—1. **ANNUAL.**—The subscription of a Governor is £5, and that of a Member £1, due in advance on the 1st of January of each year, and becoming in arrear if unpaid by the 1st of June. 2. **For Life.**—Governors may compound for their subscription for future years by paying at once the sum of £50, and Members by paying £10. Governors and Members who have paid their annual subscription for 20 years or upwards, and whose subscriptions are not in arrear, may compound for future annual subscriptions, that of the current year inclusive, by a single payment of £25 for a Governor, and £5 for a Member.

PAYMENTS.—Subscriptions may be paid to the Secretary, in the most direct and satisfactory manner, either at the Office of the Society, No. 12, Hanover Square, London, W., or by means of post-office orders, to be obtained at any of the principal post-offices throughout the kingdom, and made payable to him at the Vere Street Office, London, W.; but any cheque on a banker's or any other house of business in London will be equally available, if made payable on demand. In obtaining post-office orders care should be taken to give the postmaster the correct initials and surname of the Secretary of the Society (H. M. Jenkins), otherwise the payment will be refused to him at the post-office on which such order has been obtained; and when remitting the money-orders it should be stated by whom, and on whose account, they are sent. Cheques should be made payable as drafts on demand (not as bills only payable after sight or a certain number of days after date), and should be drawn on a London (not on a local country) banker. When payment is made to the London and Westminster Bank, St. James's Square Branch, as the bankers of the Society, it will be desirable that the Secretary should be advised by letter of such payment, in order that the entry in the banker's book may be at once identified, and the amount posted to the credit of the proper party. No coin can be remitted by post, unless the letter be registered.

NEW MEMBERS.—Every candidate for admission into the Society must be proposed by a Member; the proposer to specify in writing the full name, usual place of residence, and post-town, of the candidate, either at a Council meeting, or by letter addressed to the Secretary. Forms of Proposal may be obtained on application to the Secretary.

. Members may obtain on application to the Secretary copies of an Abstract of the Charter and Bye-laws, of a Statement of the General Objects, &c., of the Society, of Chemical, Botanical and Veterinary Privileges, and of other printed papers connected with special departments of the Society's business.

Members' Veterinary Privileges.

I.—VISITS OF A PROFESSOR OF THE ROYAL VETERINARY COLLEGE.

1. Any Member of the Society who may desire professional attendance and special advice in cases of disease among his cattle, sheep, or pigs, should apply to the Secretary of the Society, or to the Principal of the Royal Veterinary College, Camden Town, London, N.W.

2. The remuneration of the Veterinary Surgeon or a visiting Inspector will be 2*l.* 2*s.* each day as a professional fee, and the charge for personal expenses, *when such have been incurred*, which will in no case exceed one guinea per diem. He will also be allowed to charge the cost of travelling, including railway fare, and one shilling per mile if by road, to and from the locality where his services may have been required. The whole or any portion of these charges may, however, in cases of serious or extensive outbreaks of contagious disease, be remitted, so far as the Members of the Society are concerned, at the discretion of the Council, on such step being recommended to them by the Veterinary Committee.

3. The Consulting Veterinary Surgeon or visiting Inspector, on his return, will report to the Member, and, through the Principal of the Royal Veterinary College, to the Veterinary Committee, in writing, the results of his observations and proceedings with reference to the disease; which Report will be laid before the Council.

4. When contingencies arise to prevent a personal discharge of the duties, the Principal of the Royal Veterinary College may, subject to the approval of the Veterinary Committee, name some competent professional person to act in his stead, who shall be remunerated at the same rate.

II.—CONSULTATIONS WITHOUT VISIT.

Personal consultation with Veterinary Inspector	10 <i>s.</i> 6 <i>d.</i>
Consultation by letter	10 <i>s.</i> 6 <i>d.</i>
Post-mortem examination, and report thereon	2 <i>l.</i>

A return of the number of applications from Members of the Society during each half-year is required from the Consulting Veterinary Surgeon.

III.—ADMISSION OF DISEASED ANIMALS TO THE ROYAL VETERINARY COLLEGE, CAMDEN TOWN, N.W.; INVESTIGATIONS AND REPORTS.

1. All Members of the Society have the privilege of sending cattle, sheep, and pigs to the Infirmary of the Royal Veterinary College, on the following terms, viz. by paying for the keep and treatment of cattle 10*s.* 6*d.* per week each animal, and for sheep and pigs, 3*s.* 6*d.* per week.

2. A detailed Report of the cases of cattle, sheep, and pigs treated in the Infirmary of the College, or on Farms in the occupation of Members of the Society, will be furnished to the Council quarterly; and also special reports from time to time on any matter of unusual interest which may come under the notice of the Officers of the College.

IV.—VISITS OF PROVINCIAL VETERINARY SURGEONS.

The following Veterinary Surgeons have been appointed, at different centres in England and Wales, for the purpose of enabling Members of the Society to consult them with regard to the diseases of cattle, sheep, and pigs.

County.	Name and Address.
Anglesey	Hugh Jones, Brynarron, Llangefni.
Bedford	Henry Crofts, Harper Street, Bedford.
Berks	Henry Allnutt, Thames Street, Windsor.
Brecon	John Price, Brecon.
Bucks	G. A. Lepper, Aylesbury.
Cambridge	G. A. Banham, Downing Street, Cambridge.
Cardigan	Not yet appointed.
Cardiff	ditto.
Carmarthen	R. Roberts, Market Street, Abergyle.
Carnarvon	W. Lewis, 1, South Street, Nantwich Road, Crews.
Chester	Thos. Oliver, Truro.
Cornwall	John Bell, Lonsdale Street, Carlisle.
Cumberland	R. Roberts, Market Street, Abergyle.
Denbigh	

Members' Veterinary Privileges.

<i>County.</i>	<i>Name and Address.</i>
Derby	Not yet appointed.
Devon	W. Penhale, Barnstaple.
Dorset	W. Vessey, Weymouth.
Durham	H. Peele, Tower Street, West Hartlepool.
Essex	James Taylor, Vengewell Hall, Wix Manningtree.
Flint	R. Roberts, Market Street, Abergelle.
Glamorgan	Charles Mofr, Cardiff.
Gloucester	Professor Garside, Royal Agricultural College, Cirencester.
Hants	J. D. Barford, 57, Above Bar, Southampton.
Hereford	W. Good, 30, Mill Street, Ludlow.
Herts	W. Wilson, Berkhamstead.
Hunts	A. T. Sprague, Kimbolton.
Kent	W. A. Edgar, Westfield House, Dartford.
Lancaster	W. Bromley, Lancaster.
Leicester	John Wiggins, Market Harbo'.
Lincoln (South)	Captain B. H. Russell, Grantham.
Lincoln (Mid)	Charles Hartley, 4, Norman Place, Lincoln.
Lincoln (North)	J. B. Greswell, Mercer Row, Louth.
Merioneth	Evan Wynne Williams, 1, Queen's Row, Dolgelly.
Metropolis and Middlesex	Royal Veterinary College.
Monmouth	G. Lewis, Monmouth.
Montgomery	James M'Cavin, Montgomery.
Norfolk	Calver and Smith, Downham Market.
Northampton	T. J. Merrick, Castilian Street, Northampton.
Northumberland and Westmoreland	C. Stephenson, Sandford Villa, Newcastle-on-Tyne.
Notts	C. Greswell, Albert Square, Derby Road, Nottingham.
Oxford	Chas. N. Page, Banbury.
Pembroke	D. E. James, Bridge House, Haverfordwest.
Salop	W. E. Litt, Shrewsbury.
Somerset	T. D. Broad, Broad Street, Bath.
Stafford	Harry Oliver, Trescoe, Tamworth.
Suffolk	A. J. Shorten, 14, Museum Street, Ipswich.
Surrey	J. I. Lupton, Richmond.
Sussex (East)	R. A. Stock, Lewes.
Sussex (West)	J. H. Callow, Horsham.
Warwick	Osborn Hills, Leamington.
Wills	H. Hussey, Devizes.
Worcester	H. B. Perrins, Upper Butts, Worcester.
York (East Riding)	James Jebson, Yapham Grange, Pocklington.
York (North Riding)	W. Barker, Middlesborough.
York (West Riding)	Joseph Carter, 28, Great Horton Road, Bradford.

Members may obtain the attendance of a Provincial Veterinary Surgeon in any case of disease by paying his travelling expenses (which include railway fares, and 1s. per mile if by road, including the return journey), and the cost of his visit, which will be at the following rate, viz. :—

	<i>£</i>	<i>s.</i>	<i>d.</i>
When the whole day is occupied	1	10	0
When half a day or less is occupied	0	15	0
Personal consultation with Veterinary Surgeon	0	10	0
Consultation by letter	0	5	0
Post-mortem examination and report thereon	1	0	0

A return of the number of applications from Members of the Society during each half-year, embodying a statement of those cases which may be of public interest, is required from each Provincial Veterinary Surgeon. These half-yearly reports should reach the Secretary by the end of May and November respectively.

Members' Privileges of Chemical Analysis.

(Applicable only to the case of Persons who are not commercially engaged in the manufacture or sale of any substance sent for Analysis.)

THE Council have fixed the following rates of Charges for Analysis to be made by the Consulting Chemist for the *bona-fide* and sole use of Members of the Society; who, to avoid all unnecessary correspondence, are particularly requested, when applying to him, to mention the kind of analysis they require, and to quote its number in the subjoined schedule. Governors of the Society are also allowed to send to the Society's Laboratory for analysis, at the following scale of fees, any manures and feeding stuffs which are to be used by their outgoing tenants. The charge for analysis, together with the cost of the carriage of the specimens (if any), must be paid to the Consulting Chemist at the time of application:

No.		
1.	An opinion of the genuineness of bone-dust or oil-cake (each sample)	2s. 6d.
2.	An estimate of the value (relatively to the average samples in the market) of sulphate and muriate of ammonia and of the nitrates of potash and soda	5s.
3.	An analysis of guano; showing the proportion of moisture, organic matter, sand, phosphate of lime, alkaline salts and ammonia, and an estimate of its value, provided the selling price of the article to be analysed be sent with it	10s.
4.	An analysis of mineral superphosphate of lime for soluble phosphates only, and an estimate of its value, provided the selling price of the article to be analysed be sent with it	5s.
5.	An analysis of superphosphate of lime, showing the proportions of moisture, organic matter, sand, soluble and insoluble phosphates, sulphate of lime, and ammonia, and an estimate of its value, provided the selling price of the article to be analysed be sent with it	10s.
6.	An analysis, showing the value of bone-dust or any other ordinary artificial manure, provided the selling price of the manure to be analysed be sent with it	10s.
7.	An analysis of limestone, showing the proportion of lime	7s. 6d.
8.	An analysis of limestone, showing the proportion of lime and magnesia	10s.
9.	An analysis of limestone or marls, showing the proportion of carbonate, phosphate, and sulphate of lime and magnesia, with sand and clay	10s.
10.	Partial analysis of a soil, including determinations of clay, sand, organic matter, and carbonate of lime	10s.
11.	Complete analysis of a soil	£3
12.	An analysis of oil-cake or other substance used for feeding purposes, showing the proportion of moisture, oil, mineral matter, albuminous matter, and woody fibre, as well as of starch, gum, and sugar in the aggregate; and an opinion of its feeding and fattening or milk-producing properties	10s.
13.	Analysis of any vegetable product	10s.
14.	Analysis of animal products, refuse substances used for manures, &c.	from 10s. to £1
15.	Determination of the "hardness" of a sample of water before and after boiling	5s.
16.	Analysis of water of land-drainage, and of water used for irrigation	£1
17.	Analysis of water used for domestic purposes	£1 10s.
18.	Determination of nitric acid in a sample of water	10s.
19.	Examination of Viscera for Metallic poison	£2 2s.
20.	Examination of Viscera complete, for metals and alkaloids	£5 5s.
21.	Personal consultation with the Consulting Chemist. (The usual hours of attendance, Monday excepted, will be from 11 to 3, but to prevent disappointment, it is suggested that Members desiring to hold a consultation with the Consulting Chemist should write to make an appointment)	5s.
22.	Consultation by letter	5s.
23.	Consultation necessitating the writing of three or more letters	10s.

The Laboratory of the Society is at 12, Hanover Square, London, W., to which address the Consulting Chemist, Dr. J. AUGUSTUS VOELCKER, requests that all letters and parcels (postage and carriage paid) from Members of the Society, who are entitled to avail themselves of the foregoing Privileges, should be directed.

GUIDE TO THE PURCHASE OF ARTIFICIAL MANURES. AND FEEDING STUFFS.

FEEDING CAKES.

1. *Linseed-cake* should be purchased as "Pure," and the insertion of this word on the invoice should be insisted upon. The use of such words as "Best," "Genuine," &c., should be objected to by the purchaser.

2. *Rape-cake* for feeding purposes should be guaranteed "Pure," and purchased by sample.

3. *Decorticated Cotton-cake* should be guaranteed "Pure," and purchased by sample.

4. *Undecorticated Cotton-cake* should be guaranteed "Pure," and purchased by sample.

N.B.—All feeding cakes should be purchased in good condition, and the guarantee of the vendor should be immediately checked by a fair sample (taken out of the middle of the cake) being at once sent for examination to a competent analytical chemist. The remainder of the cake from which the sample sent for examination had been taken should be sealed up in the presence of a witness, and retained by the purchaser for reference in case of dispute.

ARTIFICIAL MANURES.

1. *Raw or Green Bones or Bone-dust* should be purchased as "Pure." Raw Bones guaranteed to contain not less than 45 per cent. of tribasic phosphate of lime, and to yield not less than 4 per cent. of ammonia.

2. *Boiled Bones* should be purchased as "Pure." Boiled Bones guaranteed to contain not less than 48 per cent. of tribasic phosphate of lime, and to yield not less than 1½ per cent. of ammonia.

3. *Dissolved Bones* are made of various qualities, and are sold at various prices per ton; therefore the quality should be guaranteed, under the heads of *soluble* phosphate of lime, *insoluble* phosphate of lime, and nitrogen or its equivalent as ammonia. The purchaser should also stipulate for an allowance for each unit per cent. which the dissolved bones should be found on analysis to contain less than the guaranteed percentages of the three substances already mentioned.

4. *Mineral Superphosphates* should be guaranteed to be delivered in a sufficiently dry and powdery condition, and to contain a certain percentage of *soluble* phosphate of lime, at a certain price per unit per cent., no value to be attached to *insoluble* phosphates.

5. *Compound Artificial Manures* should be purchased in the same manner and with the same guarantees as Dissolved Bones.

6. *Nitrate of Soda* should be guaranteed by the vendor to contain from 94 to 95 per cent. of pure nitrate.

7. *Sulphate of Ammonia* should be guaranteed by the vendor to contain not less than 28 per cent. of ammonia.

8. *Peruvian Guano* should be sold under that name, and guaranteed to be in a dry and friable condition, and to contain a certain percentage of ammonia.

N.B.—Artificial manures should be guaranteed to be delivered in a sufficiently dry and powdery condition to admit of distribution by the drill. A sample for analysis should be taken, not later than three days after delivery, by emptying several bags, mixing the contents together, and filling two tins holding about half a pound each, in the presence of a witness. Both the tins should be sealed, one kept by the purchaser for reference in case of dispute, and the other forwarded to a competent analytical chemist for examination.

INSTRUCTIONS FOR SELECTING AND SENDING SAMPLES FOR ANALYSIS.

ARTIFICIAL MANURES.—Take a large handful of the manure from three or four bags, mix the whole on a large sheet of paper, breaking down with the hand any lumps present, and fold up in tinfoil, or in oil-silk, about 8 oz. of the well-mixed sample, and send it to 12, HANOVER SQUARE, W., by post; or place the mixed manure in a small wooden or tin box, which may be tied by string, but must not be sealed, and send it by post. If the manure be very wet and lumpy, a larger boxful, weighing from 10 to 12 oz., should be sent either by post or railway.

Samples not exceeding 4 oz. in weight may be sent by post, by attaching two penny postage stamps to the parcel.

Samples not exceeding 8 oz., for three postage stamps.

Samples not exceeding 12 oz., for four postage stamps.

The parcels should be addressed: DR. J. AUGUSTUS VOELCKER, 12, HANOVER SQUARE, LONDON, W., and the address of the sender or the number or mark of the article be stated on parcels.

The samples may be sent in covers, or in boxes, bags of linen or other materials. No parcel sent by post must exceed 12 oz. in weight, 1 foot 6 inches in length, 9 inches in width, and 6 inches in depth.

SOILS.—Have a wooden box made 6 inches long and wide, and from 9 to 12 inches deep, according to the depth of soil and subsoil of the field. Mark out in the field a space of about 12 inches square; dig round in a slanting direction a trench, so as to leave undisturbed a block of soil with its subsoil 9 to 12 inches deep; trim this block or plan of the field to make it fit into the wooden box, invert the open box over it, press down firmly, then pass a spade under the box and lift it up, gently turn over the box, nail on the lid and send it by goods or parcel train to the laboratory. The soil will then be received in the exact position in which it is found in the field.

In the case of very light, sandy, and porous soils, the wooden box may be at once inverted over the soil and forced down by pressure, and then dug out.

WATERS.—The water, if possible, should be sent in a glass-stoppered Winchester half-gallon bottle, which is readily obtained in any chemist and druggist's shop. If Winchester bottles cannot be procured, the water may be sent in perfectly clean new stoneware spirit-jars surrounded by wickerwork. For the determination of the degree of hardness before and after boiling, only one quart wine-bottle full of water is required.

LIMESTONES, MARLS, IRONSTONES, AND OTHER MINERALS.—Whole pieces, weighing from 3 to 4 oz., should be sent enclosed in small linen bags, or wrapped in paper. Postage 2d., if under 4 oz.

OILCAKES.—Take a sample from the middle of the cake. To this end break a whole cake into two. Then break off a piece from the end where the two halves were joined together, and wrap it in paper, and send by parcel post. The piece should weigh at least from 10 to 12 oz. If sent by railway, one quarter or half a cake should be forwarded, carriage prepaid..

FEEDING MEALS.—About 3 oz. will be sufficient for analysis. Enclose the meal in a small linen bag. Send it by post.

On forwarding samples, separate letters should be sent to the laboratory, specifying the nature of the information required, and, if possible, the object in view.

Members' Botanical and Entomological Privileges.

The Council have fixed the following rates of charge for the examination of Plants, Seeds, and Insects for the *bona fide* and individual use and information of Members of the Society (not being seedsmen), who are particularly requested, when applying to the Consulting Botanist, or to the Honorary Consulting Entomologist, to mention the kind of examination they require, and to quote its number in the subjoined schedule. The charge for examination must be paid at the time of application, and the carriage of all parcels must be prepaid.

I. BOTANICAL.

No.

- 1.—A report on the purity, amount, and nature of foreign materials, the perfectness, and germinating power of a sample of seed .. 5s.
- 2.—Determination of the species of any weed or other plant, or of any epiphyte or vegetable parasite, with a report on its habits, and the means for its extermination or prevention 5s.
- 3.—Report on any disease affecting farm crops 5s.
- 4.—Determination of the species of a collection of natural grasses found in any district, with a report on their habits and pasture value 10s.

N.B.—The Consulting Botanist's Reports are furnished to enable Members—purchasers of seeds and corn for agricultural purposes—to test the value of what they buy, and are not to be used or made available for advertising or trade purposes by seedsmen or otherwise.

INSTRUCTIONS FOR SELECTING AND SENDING SAMPLES.

In sending seed or corn for examination the utmost care must be taken to secure a fair and honest sample. In the case of grass-seeds the sample should be drawn from the centre of the sack or bag, and in all cases from the bulk delivered to the purchaser. If anything supposed to be injurious or useless exists in the corn or seed, selected samples should also be sent.

When possible, at least one ounce of grass and other small seeds should be sent, and two ounces of cereals or larger seeds. The exact name under which the seed has been bought (but preferably a copy of the invoice) should accompany the sample.

Grass seeds should be sent at least four weeks, and clover seeds two weeks before they are to be used.

In collecting specimens of plants, the whole plant should be taken up, and the earth shaken from the roots. If possible, the plants must be in flower or fruit. They should be packed in a light box, or in a firm paper parcel.

Specimens of diseased plants or of parasites should be forwarded as fresh as possible. Place them in a bottle, or pack them in tinfoil or oil-silk.

All specimens should be accompanied with a letter specifying the nature of the information required, and stating any local circumstances (soil, situation, &c.) which, in the opinion of the sender, would be likely to throw light on the inquiry.

Parcels or letters containing seeds or plants for examination (carriage or postage prepaid) must be addressed to Mr. W. Carruthers, F.R.S., Central House, Central Hill, Norwood, S.E.

It is necessary that before the purchaser of seeds send the sample for examination he secure—

1. That the vendor specify the nature of the article supplied.
2. That the bulk be true to the bulk specified.
3. That it contain not more than 5 per cent. of seeds other than the species ordered.
4. That the germinating power shall be, for cereals, green crops, clovers, and timothy grass, not less than 90 per cent.; for fox-tail, not less than 50 per cent.; and for other grasses not less than 70 per cent.

The Council strongly recommend that the purchase of prepared mixtures should be avoided, and that the different seeds to be sown should be purchased separately.

II. ENTOMOLOGICAL.

Determination of the species of any insect, worm, or other animal which, in any stage of its life, injuriously affects farm crops, with a report on its habits and suggestions as to its extermination 2s. 6d.

Parcels or letters containing insects, or plants apparently infested with insects, sent for examination, must be addressed to Miss ORMEROD, F.R.Met.Soc., Dunster Lodge, Isleworth.

Royal Agricultural Society of England.

1885.

President.

H.R.H. THE PRINCE OF WALES, K.G.

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Year
when
Elected.

1879	H.R.H. THE PRINCE OF WALES, K.G., <i>Marlborough House, Pall Mall, S.W.</i>
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1857	BRIDPORT, General Viscount, <i>Cricket St. Thomas, Chard, Somersetshire.</i>
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1863	KINGSCOTE, Col., C.B., <i>Kingscote, Wotton-under-Edge, Gloucestershire.</i>
1868	LICHFIELD, Earl of, <i>Shugborough, Staffordshire.</i>
1854	MACDONALD, Sir ARCHIBALD KEPPEL, Bt., <i>Woolmer Lodge, Liphook, Hants.</i>
1839	PORTMAN, Viscount, <i>Bryanston, Blandford, Dorset.</i>
1856	POWIS, Earl of, <i>Powis Castle, Welshpool, Montgomeryshire.</i>
1858	RUTLAND, Duke of, K.G., <i>Belvoir Castle (Leicestershire), Grantham.</i>
1861	WELLS, WILLIAM, <i>Holmeewood (Huntingdonshire), Peterborough.</i>

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1885	COVENTRY, Earl of, <i>Croome Court, Severn Stoke, Worcestershire.</i>
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1860	DRUCE, JOSEPH, <i>Eynsham, Oxford.</i>
1882	EMLYN, Viscount, M.P., <i>Golden Grove, Carmarthen, S. Wales.</i>

Year when Elected.	
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1875	FRANKISH, WILLIAM, <i>Limber Magna, Uleaby, Lincolnshire.</i>
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1869	LEEDS, ROBERT, <i>Kenwick Old Hall, Norwich.</i>
1881	LITTLE, HERBERT J., <i>Coldham Hall, Wisbech, Cambridgeshire.</i>
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1861	RANDELL, CHARLES, <i>Chadbury, Evesham, Worcestershire.</i>
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1874	SANDAY, GEORGE H., <i>Langdale Lodge, Atkins Rd., Clapham Park, Surrey.</i>
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1870	WHITEHEAD, CHARLES, <i>Barming House, Maidstone, Kent.</i>
1865	WILSON, JACOB, <i>Chillingham Barns, Belford, Northumberland.</i>
1878	WISE, GEORGE, <i>Woodcote, Warwick.</i>

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Cattle Plague Committee.

THE WHOLE COUNCIL.

* * The PRESIDENT, TRUSTEES, and VICE-PRESIDENTS are Members *ex officio* of all Committees.

Royal Agricultural Society of England.

GENERAL MEETING,

12, HANOVER SQUARE, FRIDAY, MAY 22ND, 1885

REPORT OF THE COUNCIL.

THE Council are glad to be able to report that the recent accession of Members to the Society has continued during the past half-year, during which period 337 Members have been elected. The changes in the roll of the Society since the last Annual Meeting in May 1884, have been the following:— 724 Members have been elected, 184 have resigned, 7 Governors and 122 Members have died, and 74 Members have been removed from the list by order of the Council.

The Society now consists of

71 Life Governors,
69 Annual Governors,
3356 Life Members,
5619 Annual Members,
20 Honorary Members,

making a total of 9135, and showing an increase of 359 Members since this time last year.

The vacancy in the Council reported at the last General Meeting has been filled up by the election of the Earl of Coventry; and a more recent vacancy, caused by the death of

Mr. John Evans, of Uffington, Shrewsbury, is still under the consideration of the Council.

The accounts for the year 1884 have been examined and certified by the auditors and accountants of the Society, and have been published in the current number of the 'Journal,' together with the statement of Receipts and Expenditure relating to the Shrewsbury Meeting. The funded property of the Society stands at 29,885*l.* 4*s.* 4*d.* New Three per Cents. ; the balance of the current account in the hands of the Society's bankers on the 1st instant was 7553*l.* 12*s.* 7*d.*, and 2000*l.* remained on deposit.

As already announced, the Preston Meeting will commence on Wednesday morning, July 15th, and close on Monday evening, July 20th, but the Implement portion of the Show will be open to Members of the Society and the public on Tuesday, July 14th.

The practical examination of Dairy workers mentioned in the December report will be held in the Working Dairy at Preston during the week preceding the Show. The Council have decided to give certificates of efficiency to those makers of Butter and Cheese who may be certified by the Judges as entitled to them ; and also to give Prizes in each class to those who show the greatest skill in the various operations. As far as practicable, the decisions of the Judges will be announced at the General Meeting held in the Showyard. The Council trust that this new scheme of practical examinations may tend to the benefit of the Dairy-workers who obtain the Society's Certificate of Efficiency, and at the same time lessen the difficulty which dairy farmers find in obtaining competent persons to make Butter and Cheese.

An invitation from the authorities of the City of Norwich with regard to the Country Meeting of 1886 having been received by the Council, it has been resolved, after due

investigation and enquiry, that next year's Show be held in that locality.

The Country Meeting for the year 1887 will be held in the District which includes the Counties of Cumberland, Durham, Northumberland, and Westmoreland.

The Council have to report that the vacancy in the post of Consulting Chemist, caused by the regretted death of Dr. Voelcker, has been filled by the election of his eldest son, Dr. John Augustus Voelcker, Ph.D., B.A., B.Sc., whose testimonials and antecedents, carefully considered with those of the other candidates for the post, satisfied the Council that he was eminently qualified to fulfil the duties which had been so long and efficiently discharged by his father.

The recent Quarterly Reports of the Chemical Committee contain several cases of purchase by Members of the Society of inferior and adulterated feeding-cakes. Improvements in mechanical means of pressure appear to have enabled some crushers to produce an otherwise pure cake very poor in oil, which is its most valuable feeding constituent; other crushers translate the word "pure" to mean "as imported," with weed-seeds included; and some again mix with the crushed linseed other wholesome materials, which, however, are not of the same money or feeding value as pure linseed-cake.

The Woburn Experiments have been continued and further extended through the liberality of the Duke of Bedford, five silos having been erected in the course of last year at Crawley Heath Farm. In connection with these a series of feeding experiments with silage has been in progress at Crawley Mill Farm, the interim results of which have recently been published, and in addition chemical investigations on the subject of Ensilage have been made in the Society's Laboratory.

The Annual Excursion of Members to the Woburn Experimental Farm will take place on Thursday, June 4th.

Mr. Neville having resigned the office of Steward of Engineering, the Council take this opportunity of acknowledging the value of his services to the Society, and are gratified in being able to report that Mr. W. Anderson, of the firm of Easton and Anderson, has undertaken the management of the Society's Engineering Department as Consulting Engineer.

The Examiners of the Royal College of Veterinary Surgeons have reported that the two students who passed best in the subject of the Pathology of Cattle, Sheep, and Pigs at the recent Diploma Examination, and who thereby became entitled to the Society's Medals, were

Mr. F. T. Harvey, of St. Columb, Cornwall, Silver Medal.

Mr. Charles Heinemann, St. Peter's Road, Mile End, Bronze Medal.

The isolated outbreaks of Foot-and-Mouth disease in several districts during the past six months have been the subject of frequent communications with Professor Brown in his official capacity; and his reports, presented to the Council at their Monthly Meetings, have placed the Members of the Society periodically in possession of valuable information.

The Council have resolved "That in consideration of the national importance of maintaining the supply of hunters and other half-bred horses, a Special Committee of the Council be appointed to consider the best means of securing the services of stallions at reasonable fees." This Committee is now investigating the question which has been thus submitted to them.

The number of Candidates entered for the Society's Senior Examination for Prizes and Certificates shows a satisfactory increase over last year, being sixteen as compared with ten; but only twelve presented themselves for examination. The

result of the examination was that the following candidates placed in the order of merit obtained First-Class Certificates and the Life Membership of the Society, besides qualifying for the Prizes as stated below :—

Bhupal Chandra Basu, Royal Agricultural College, Cirencester, 25*l*.

Thomas Arthur Dickson, Royal Agricultural College, Cirencester, 15*l*.

Atul Krishna Ray, Royal Agricultural College, Cirencester, 10*l*.

In addition to the above, a Second-Class Certificate was gained by Cecil Henry Hooper, Elmleigh, Hayne Road, Beckenham.

By Order of the Council,

H. M. JENKINS,

Secretary.

ROYAL AGRICULTURAL

DR.

HALF-YEARLY CASH ACCOUNT

			£	s.	d.	£	s.	d.
To Balance in hand, 1st January, 1885:—						708	2	8
Bankers						63	4	1
Secretary								
								771 6 6
To Income:—								
Dividends on Stock						435	4	1
Subscriptions:—								
Governor's Life Composition			50	0	0			
Governors' Annual			260	0	0			
Members' Life-Compositions			967	0	0			
Members' Annual			4,210	6	0			
						5,487	6	0
Establishment:—								
Rent						210	0	0
Journal:—								
Sales			68	18	8			
Advertisements			149	18	3			
Sale of Pamphlets			22	17	5			
Prize offered by Col. Turberville			25	0	0			
						266	12	4
Chemical:—								
Laboratory Fees.. .. .						189	1	3
Education:—								
Sale of Insect Diagrams						7	16	0
Shrewsbury Meeting						268	5	7
Total Income								6,864 5 3
To Preston Meeting								7,291 4 9
								£14,926 16 6

BALANCE-SHEET,

			£	s.	d.	£	s.	d.
To Capital:—								
Surplus, 31st December, 1884						34,576	2	11
Surplus of Income over Expenditure during the Half-year, viz.:—								
Income			6,864	5	3			
Expenditure			3,457	5	1			
						3,407	0	2
Deduct half-year's interest and depreciation on Country Meeting } Plant								37,983 3 1
								263 0 2
								£37,720 2 11

QUILTER, BALL, CROSBIE, GLEGG & WELTON, Accountants.

SOCIETY OF ENGLAND.

FROM 1ST JANUARY TO 30TH JUNE, 1885.

CR.

By Expenditure:—	£ s. d.	£ s. d.	£ s. d.
Establishment:—			
Salaries, Wages, &c.	902 10 0		
House:—Rent, Taxes, Repairs, &c.	398 3 8		
Office:—Printing, Postage, Stationery, &c.	222 5 5		
		1,520 19 1	
Journal:—			
Printing and Stitching	679 3 9		
Printing Advertisements	67 18 6		
Postage and Delivery	250 0 0		
Literary Contributions	148 6 0		
Prize Essay	25 0 0		
Engravings	39 13 0		
		1,210 1 3	
Chemical:—			
Salaries	277 17 8		
Instruments and Chemicals	18 0 6		
Advertising	7 11 9		
Petty Payments	19 14 0		
		323 3 11	
Veterinary:—			
Professional Fee		23 1 2	
Botanical:—			
Consulting Botanist's Salary	50 0 0		
Consulting Entomologist's Salary	25 0 0		
		75 0 0	
Education:—			
Fees to Examiners	36 15 0		
Advertising	22 12 9		
Prizes	50 0 0		
		109 7 9	
Farm Inspection:—			
Judges (on account)	68 3 7		
Entry Fee returned	1 0 0		
		69 3 7	
Subscriptions returned (paid in error)		7 2 0	
Sundries		24 14 2	
Shrewsbury Meeting		94 12 2	
Total Expenditure			3,457 5 1
By Preston Meeting			5,987 16 11
By Balance in hand, 30th June:—			
Bankers	3,473 12 7		
Secretary	8 1 11		
		3,481 14 6	
At Deposit		2,000 0 0	
			5,481 14 6
			£14,926 16 6

30TH JUNE, 1885.

ASSETS.		£ s. d.	£ s. d.
By Cash in hand		3,481 14 6	
By New 3 per Cent. Stock 29,885 <i>l.</i> 4 <i>s.</i> 4 <i>d.</i> cost*		29,177 17 1	
By Books and Furniture in Society's House		1,461 17 6	
By Country Meeting Plant		3,243 16 0	
By Deposit Account		2,000 0 0	
			39,355 5 1
Less at Credit of Preston Meeting			1,633 2 2
* Value at 99½ = 29,661 <i>l.</i> 1 <i>s.</i> 4 <i>d.</i>			
<i>Mem.</i> —The above Assets are exclusive of the amount recoverable in respect of arrears of Subscriptions to 30th June, 1885, which at that date amounted to 2,341 <i>l.</i>			
			£37,720 2 11

Examined, audited, and found correct, this 28th day of September, 1885.

FRANCIS SHERBORN,
A. H. JOHNSON,
C. GAY ROBERTS,

} Auditors on behalf of the Society.

PRESTON MEETING,
1885.

STEWARDS OF DEPARTMENTS.

Implements.

HON. CECIL T. PARKER.
SIR JOHN H. THOROLD, BART.
H. J. LITTLE.

Stock.

HUGH GORRINGE.
ALFRED ASHWORTH.
G. H. SANDAY.
VISCOUNT EMLYN, M.P.

Poultry and Dairying.

G. MANDER ALLENDER.

Forage.

T. HORROCKS MILLER.

Finance.

CHARLES RANDELL.

WILLIAM FRANKISH.

General Arrangements.

JACOB WILSON.

JUDGES OF IMPLEMENTS.

J. W. KIMBER.

JOSEPH MARTIN.

C. GAY ROBERTS.

JUDGES OF STOCK, &c.

HORSES.

Shire and Agricultural.

JAMES R. BLACK.
HENRY SMITH.
C. WADLOW.

Clydesdales.

D. ALSTON.
J. MCQUEEN.

Suffolks.

DANIEL A. GREEN.
R. H. WRINCH.

Thoroughbreds and Hunters.

J. B. BOOTH.
EARL OF COVENTRY.
CAPT. EDWARDS HEATHCOTE.

Hackneys, Harness, Roadsters, and Ponies.

CAPT. FIFE.
W. PARKER.
JOHN ROWELL.

CATTLE.

Shorthorns.

H. W. B. BERWICK.
J. W. CRUICKSHANK.
C. STEVENSON.

Herefords and Welsh.

J. CRANE.
J. GRIFFITHS.
KEES KEENE.

Devons, Sussex, and Red Polled.

R. COOKE.
CHARLES ELLIS.
S. P. NEWBURY.

Jerseys.

WALTER GILBEY.
COL. LE CORNU.

Polled Angus.

W. ROBERTSON.
ROBERT WALKER.

Galloways.

J. MAXWELL CLARK.
T. GIBBONS.

Ayrshires and Dairy.

ANDREW ALLAN.
T. BOWSTEAD.
R. FEARNALL.

SHEEP.

Leicesters, Cotswolds, and Lincoln.

H. MACKINDER.
WILLIAM SANDAY.
T. THORNTON.

Border Leicesters and Cheviots.

J. DAVISON.
T. ELLIOTT.
GEORGE REA.

Oxfordshire Downs.

J. P. CASE.
W. D. LITTLE.

Shropshires.

CHARLES COXON.
CHARLES RANDELL.

Southdowns and Hampshires.

THOMAS COOPER.
J. A. HEMPSON.
S. W. TAYLOR.

**Other Short-woolled Breeds, Grey-faced,
Black-faced, and Welsh.**

JOHN CLAY.
D. DAVIES.
R. PATERSON.

Lonks, Herdwicks, and Wenaleydales.

H. P. HOLME.
J. INGLEBY.
JAMES PICKARD.

PIGS.

White Breeds.

JOHN ANGUS.
J. BARRON.
G. MANGLES.

Black Breeds and Tamworth.

RICHARD FOWLER.
JOSEPH SMITH.
J. TREADWELL.

INSPECTORS OF SHEARING.

WILLIAM JOBSON.

J. B. WORKMAN.

JUDGES OF CHEESE AND BUTTER.

G. W. BURBOWS.

WILLIAM BOYD.

JAMES WATSON.

JUDGES OF BEE-KEEPING APPLIANCES, &c.

THOMAS W. COWAN.

R. R. GODFREY.

JOHN M. HOOKER.

JUDGES OF POULTRY.

JAMES LONG.

R. TEEBAY.

W. B. TEGETMEIER.

JUDGES OF DAIRY-WORKERS.

Cheese.

MRS. GIBBONS.
MRS. NUTTALL.

Butter.

MISS SMITHARD.
MRS. TRAVIS.

JUDGES OF FARMS.

Classes 1 and 2.

JAMES EDWARDS.
TRASDALE H. HUTCHINSON.
GARRETT TAYLOR.

Classes 3 to 7.

J. C. MORTON.
T. NUTTALL.
S. ROWLANDSON.

AWARD OF PRIZES.

NOTE.—The Judges were instructed, in addition to awarding the Prizes, to designate as the *Reserve Number* one animal in each Class, next in order of merit, if it possessed sufficient for a Prize; in case an animal to which a Prize was awarded should subsequently become disqualified.

Prizes given by the Preston Local Committee are marked thus ().*

HORSES.

CLASS 1.—*Shire or Agricultural Stallions foaled in the Year 1882.*

- 10 JOHN MARTLAND, Causewayend Farm, Rufford, Ormskirk, Lancashire: **FIRST PRIZE, 25*l.***, and the **CHAMPION PRIZE, 25*l.***,† for “Rufford Champion” (3996), bay; bred by himself; sire, “Bar None” (2388); dam, “Rose,” by “Honest Tom” (1105).
- 9 THOMAS SHAW, The Island, Winmarleigh, Garstang, Lancashire: **SECOND PRIZE, 15*l.***, for “Trajan” (3379), bay; bred by Mr. Jackson, Stalmire, Poulton-le-Fylde; sire, “Raglan” (3276); dam, “Queen of the West,” by “Drayman” (640).
- 4 GARRETT TAYLOR, Trowse House, Norwich: **THIRD PRIZE, 5*l.***, for “Gracchus” (3104), chestnut; bred by Mr. Colgrove, Winalow, Bucks; sire, “Black Prince” (176); dam, “Black Bess,” by “Waxwork” (2299).
- 6 THOMAS HORROCKS MILLER, Singleton Park, Poulton-le-Fylde, Lancashire: the *Reserve Number* and *Highly Commended* for “MM” (3205), bay; bred by Messrs. J. and R. Gardner, Cockerham, Garstang, Lancashire; sire, “Honest Tom” (1105); dam, “Bridget,” by “What’s Wanted” (2332).

CLASS 2.—*Shire or Agricultural Stallions foaled in the Year 1883.*

- 34 THE EARL OF ELLESMERE, Worsley Hall, Manchester: **FIRST PRIZE, 20*l.***, for “Western King” (4172), chestnut; bred by Mr. Jackson, Poulton-le-Fylde; sire, “What’s Wanted” (2332); dam, “Brock,” by “Sir Colin” (2022).
- 18 EDWARD GREEN, Bank Farm, Pool Quay, Welshpool, Montgomeryshire: **SECOND PRIZE, 15*l.***, for “Jolly Boy” (3764), black; bred by himself; sire, “Fortrey Samson” (2426); dam, “Jolly-Green’s,” by “England’s Wonder.”
- 19 GEORGE HARRISON, Northfield House, Everton, Bawtry: **THIRD PRIZE, 5*l.***, for “Lancashire Tom” (3793), black; bred by Mr. A. Illingworth, Thornley, Preston; sire, “Tom of the Shires” (2682); dam, “Lancashire Lass,” by “What’s Wanted” (2332).
- 32 GEORGE STREET, Maulden, Ampthill, Bedfordshire: the *Reserve Number* and *Highly Commended* for “Maulden Primus” (3866), brown; bred by himself; sire, “Champion of England” (477); dam, “Cardiff Lass,” by “Britain” (261).

† Given by The Shire-horse Society for the best Shire Stallion in the Showyard.

CLASS 3.—*Shire or Agricultural Stallions foaled in the Year 1884.*

- 53 **THE EARL OF ELLESMERE**, Worsley Hall, Manchester: **FIRST PRIZE**, 15*l.*, and the *Reserve Number* for Champion Prize for "Shrewsbury," bay; sire, "Esquire" (2774); dam, "Darling," by "Edmondson's England's Glory": and (51); **SECOND PRIZE**, 10*l.*, for "Embassy," bay; sire, "Ambassador" (3428); dam, "Sweet Briar," by "William the Conqueror" (2343); both bred by himself.
- 40 **JAMES FIRTH CROWTHER**, Knowl Grove, Mirfield, Yorkshire: **THIRD PRIZE**, 5*l.*, for "A 1 Quality," chestnut; bred by Mrs. N. Hornsby, Ribby Hall, Kirkham; sire, "Bar None" (2388); dam, "Brock," by "What's Wanted" (2332).
- 55 **HENRY BROWNE**, Bury, Huntingdonshire: the *Reserve Number* and *Highly Commended* for "Hopeful," brown; bred by Mr. J. E. Parsons, Charwelton, Daventry; sire, "Bonny Tom" (241); dam, "Beauty," by "Noble" (1639).

CLASS 4.—*Shire or Agricultural Colt Foals, the produce of Mares exhibited in Class 13.**

- 127* **WILLIAM LAWRENSON**, Johnson's Farm, Out Rawcliffe, Garstang, Lancashire: **FIRST PRIZE**, 15*l.*, for his black; bred by himself; sire, "Lincoln" (1350); dam, "Brock," by "Ploughboy" (1745).
- 136* **THE EXECUTORS OF THE LATE MR. EDWARD CHARNOCK**, Rose Bank Farm, Fazakerley, Liverpool, **SECOND PRIZE**, 10*l.*, for their black; bred by themselves; sire, "Harold"; dam, by "Samson Junior" (1991).
- 135* **THOMAS WILLIAMSON**, Hales Hall Farm, Out Rawcliffe, Garstang, Lancashire: **THIRD PRIZE**, 5*l.*, for his bay; bred by himself; sire, "Lincoln" (1350); dam, "Snip," by "Ploughboy" (1749).
- 133* **GEORGE SINGLETON**, Harrison House, St. Michaels-on-Wyre, Garstang, Lancashire: the *Reserve Number* and *Highly Commended* for his bay; bred by himself; sire, "Garnet" (2787); dam, "Smiler," by "Sir Colin" (2022).

CLASS 5.—*Clydesdale Stallions foaled in the Year 1882.*

- 59 **LADY OSSINGTON**, The Dean, Kilmarnock, Ayrshire: **FIRST PRIZE**, 25*l.*, for "The Macneillage" (2992), brown; bred by Mr. W. Gray, Muncraig, Kirkcudbright; sire, "McGregor" (1487); dam, "Jess" (1295), by "Crown Prince" (207).
- 58 **ALEXANDER McCOWAN**, Newtonairs, Dumfries, N.B.: **SECOND PRIZE**, 15*l.*, for "Scotch Pearl," late "Lindores Abbey" (2949), bay; bred by Mr. James Affleck, Barnhills, Leshmahagow, Lanark, N.B.; sire, "St. Lawrence" (3220); dam, "Jean of Barnhills" (1873), by "Garibaldi" (315).
- 62 **JOHN WADDELL**, Inch, Bathgate, Linlithgow, N.B.: **THIRD PRIZE**, 5*l.*, for "Young Duke of Hamilton" (4122), brown; bred by himself; sire, "Duke of Hamilton" (2074); dam, "Judy" (4220), by "Young Lord Lyon" (994).
- 61 **JOHN D. LANG**, Knowle, Sidmouth, Devonshire: the *Reserve Number* and *Commended* for "Pride of the Glen" (3080), bay; bred by Mr. Peter Anderson, Glentriplock, Port William; sire, "Pride of Dunlop" (1244); dam, "Jess of Glentriplock" (682), by "Duke of Edinburgh" (246).

CLASS 6.—*Olydesdale Stallions foaled in the Year 1883.*

- 69 LORDS ARTHUR and LIONEL CECIL, Orchardmains, Innerleithen, N.B. : **FIRST PRIZE, 20*l.***, for "Claymore," bay; bred by themselves; sire, "Macgregor" (1487); dam, "Cornelia" (2035), by "Bonnie Scotland" (1076).
- 67 GEORGE RODGER, Newton Bank, Preston Brook: **SECOND PRIZE, 10*l.***, for "Little Jock Elliott" (3768), bay; bred by himself; sire, "Macgregor" (1487); dam, "Dawn of Mystery" (2895), by "Prince Charlie" (629).
- 64 THE EARL OF STRATHMORE, Glamis Castle, Forfarshire: **THIRD PRIZE, 5*l.***, for "Star of Belton" (4032), bay; bred by Mr. Forbes Wallace, South Belton, Dunbar, N.B.; sire, "Fitzlyon" (1656); dam, "Lily" (4233), by "Lifter" (871).
- 76 THE MARQUESS OF LONDONDERRY, Seaham Hall, Seaham Harbour, Co., Durham: the *Reserve Number* and *Highly Commended* for "King Laurence," black; bred by himself; sire, "King of the Clans" (2201); dam, "Lucy," by "Lifter" (871).

CLASS 7.—*Clydesdale Stallions foaled in the Year 1884.*

- 87 WALTER S. PARK, Hatton Farm, Bishopton, Renfrewshire: **FIRST PRIZE, 15*l.***, for his brown; bred by Mrs. Black, Devol Farm, Port Glasgow, Renfrewshire; sire, "Topgallant" (1850); dam, "Nancy," by "General Williams."
- 84 THE DUKE OF PORTLAND, The Dean, Kilmarnock, Ayrshire: **SECOND PRIZE, 10*l.***, for "Holyrood," strawberry roan; bred by Mr. A. McCowan, Newtonairs, Dumfries; sire, "Auld Reekie" (1920); dam, "Kate of Banks" (2612), by "Young Ross" (1370).
- 81 ALEXANDER McCOWAN, Newtonairs, Dumfries, N.B.: **THIRD PRIZE, 5*l.***, for "Newtonairs Yet," brown; bred by Mr. A. Montgomery, Netherhall, Castle Douglas, N.B.; sire, "Macgregor" (1487); dam, "Rosie" (1499), by "Liberal Tom" (446).
- 86 THE REV. JOHN GILLESPIE and R. W. MUNN, Meikleholm Farm, Dunholm: the *Reserve Number* and *Highly Commended* for "Grenadier Guardsman," bay; bred by Mr. Walter Adamson, Harleyholm, Thankerton, Lanarkshire; sire, "Lord Clyde" (1741); dam, "Maggie of Harleyholm," by "London Tam" (509).

CLASS 8.—*Suffolk Stallions foaled in the Year 1882.*

- 92 SAMUEL WOLTON, Butley Abbey, Wickham Market, Suffolk: **FIRST PRIZE, 20*l.***, for "Dreadnought," chestnut; bred by himself; sire, "Chieftain" (1354); dam, "Ash Darling" (1058), by "Duke" (1050).
- 90 FREDERICK DAVIES KENT, Corringham, Romford, Essex: **SECOND PRIZE, 10*l.***, for "Marshman," chestnut; bred by Mr. F. Asplin, East Tilbury, Romford; sire, "Ben" (139); dam, "Brisk," by "Briton."
- 91 SAMUEL WOLTON, Butley Abbey: the *Reserve Number* and *Highly Commended* for "Checkmate," chestnut; bred by himself; sire, "Royalty" (1339); dam, "Foxhall Chance II." (1077), by "Monarch" (1348).

CLASS 9.—*Suffolk Stallions foaled in the Year 1883.*

- 95 HORACE WOLTON, Newbourn Hall, Woodbridge: **FIRST PRIZE, 15*l.***, for "Duke of Suffolk" (1449), chestnut; bred by himself; sire, "Tiptop" (1367); dam, "Duchess of Newbourn" (1032), by "Warrior" (1353).

- 94 ALFRED J. SMITH, Rendlesham, Woodbridge: SECOND PRIZE, 10*l.*, for "Prince of May" (1586), chestnut; bred by himself; sire, "Cupbearer III." (566); dam, "May Queen" (837), by "Prince Imperial" (1239).
- 97 SAMUEL WOLTON, Butley Abbey: the *Reserve Number* and *Highly Commended* for "Vagabond," chestnut; bred by himself; sire, "Chieftain" (1354); dam, "Spotted Victory" (1096), by "Monarch" (1348).

CLASS 10.—*Thoroughbred Stallions suitable for getting Hunters.*

- 105 THOMAS OLDHAM, White Hart Hotel, Gainsborough, Lincolnshire: FIRST PRIZE, 100*l.*,† for "Knight of the Launde," bay, was foaled in 1875; bred by Mr. Matthew Brown, Radholme, Launde, Clitheroe, Yorks.; sire, "Knight of the Garter;" dam, "May Queen," by "Kettledrum."
- 110 WALTER GILBEY, Elsenham Hall, Essex: SECOND PRIZE, 20*l.*, for "Pedometer," brown, was foaled in 1872; bred by Mr. Thomas Dawson, Middleham, Yorkshire; sire, "King Tom;" dam, "Miss Peddie," by "Poynton."
- 101 JAMES RUSSEL, Dundas Castle, South Queensferry, Linlithgowshire: THIRD PRIZE, 10*l.*, for "Boycott" (late "Young Sunstroke"), bay, was foaled in 1873; bred by Mr. J. Parker, Chester; sire, "Sunstroke;" dam, "One Act," by "Annandale."
- 102 JOHN BRBBINGTON, Walgherton, Nantwich, Cheshire: the *Reserve Number* for "Figaro," chestnut, was foaled in 1880; bred by the Earl of Rosebery, The Durdans, Epsom; sire, "Kisber;" dam, "Gossip," by "Flash in the Pan."

CLASS 11.—*Hackney Stallions.*

- 115 WALTER GILBEY, Elsenham Hall, Essex: FIRST PRIZE, 20*l.*, for "County Member" (948), brown, was foaled in 1881; bred by Mr. James Drury, Long Riston, Hull, Yorkshire; sire, "Lord Derby 2nd" (417); dam by "Kendale Performer" (391).
- 113 SAMUEL ROSE, Godmanchester, Huntingdonshire: SECOND PRIZE, 10*l.*, for "Lord Bang" (1030), roan, was foaled in 1880; bred by Mr. J. Bayes, Primrose Hill Farm, Chatteris, Cambs.; sire, "Tibbett's Great Shot;" dam by "Old Perfection."
- 112 GEORGE BOURDASS, Hunmanby, Yorkshire: the *Reserve Number* for "Danegelt" (174), chestnut, was foaled in 1879; bred by Mr. F. Rickell, Warton, Pocklington, Yorkshire; sire, "Denmark" (177); dam, "Young Nellie" by "St. Giles" (687).

CLASS 12.—*Pony Stallions.*

- 116 JONATHAN EDMUND BACKHOUSE, The Rookery, Richmond, Yorkshire: FIRST PRIZE, 15*l.*, for "Sir William" (1178), brown, was foaled in 1879; bred by Mr. Christopher Wilson, Rigmaden Park, Kirkby Lonsdale; sire, "Sir George" (778); dam, "Maggie," by "Derby" (953).
- 118 DONALD J. HAMPBELL MARTIN, Auchendennan Farm, Balloch, Dumbartonshire: SECOND PRIZE, 10*l.*, for "Mars" (1234), brown; was foaled in 1878; bred by Mr. J. M. Martin, Auchendennan, Balloch, N.B.; sire, "Derby" (953).
- 117 JONATHAN EDMUND BACKHOUSE, The Rookery: THIRD PRIZE, 5*l.*, for "Sir John" (1170), bay; was foaled in 1879; bred by Mr. Christopher Wilson, Rigmaden Park, Kirkby Lonsdale; sire, "Sir George" (778).

† Including 50*l.* given by the Borough of Blackpool.

- 121 HENRY ROUNDELL, Black Horse Hotel, Otley, Yorkshire: the *Reserve Number* for "Sir Harry," black; was foaled in 1878; bred by himself; sire, "Sir George Wombwell;" dam by "Despatch."

CLASS 13.—Shire or Agricultural Mares and Foals. The Foals to compete in Classes 4 or 22.

- 145 THE EARL OF ELLESMERE, Worsley Hall, Manchester: **FIRST PRIZE, 20*l.***, for "Lady Lincoln," brown; was foaled in 1879; bred by Mr. Whyman, Ambaston, Derby; sire, "Lincolnshire Lad II." (1365); dam by "Devonshire" (594).
- 133 GEORGE SINGLETON, Harrison House, 'St. Michaels-on-Wyre, Garstang, Lancashire: **SECOND PRIZE, 10*l.***, for "Smiler," bay; was foaled in 1878; bred by Mr. Edward Wearden, Gradwell Stack, Bispham, Lancashire; sire, "Sir Colin" (2022); dam, "Brock," by "Master of Arts."
- 125 THE HON. E. COKE, Longford, Derbyshire: **THIRD PRIZE, 5*l.***, for "Comfort," bay; was foaled in 1881; bred by Mrs. Williams, Barrow-on-Trent, Derbyshire; sire, "What's Wanted" (3397); dam, "Flower," by "Crown Prince" (558).
- 144 THE EARL OF ELLESMERE, Worsley Hall, Manchester: the *Reserve Number* and *Highly Commended* for "Blossom 2nd," bay; was foaled in 1880; bred by Mr. John Hopper, Whittlesea, Cambridgeshire; sire, "Thumper" (2136); dam, "Blaze," by "Champion" (450).

CLASS 14.—Clydesdale Mares and Foals.

- 157 THE EARL OF ELLESMERE, Worsley Hall, Manchester: **FIRST PRIZE, 20*l.***, for "Flower Girl," black; was foaled in 1881 (foal by "Kirk" (1463)); bred by Mr. Thomas Chapman, of Peasemore, Newbury, Berkshire; sire, "Young Prince of Wales" (1016); dam, "Forest Queen" (491), by "Farmer's Glory" (304).
- 162 THE MARQUESS OF LONDONDERY, Seaham Hall, Co. Durham: **SECOND PRIZE, 10*l.***, for "Dora," brown; was foaled in 1879 (foal by "Go Bang" (3656)); bred by the Keir Trustees, Keir Maina, Dunblane, Perthshire; sire, "Newstead" (559); dam, "Keir Fanny" (193) by "Tintack"; and (161) **THIRD PRIZE, 5*l.***, for "Milkmaid" (1452), bay; was foaled in 1877 (foal by "Go Bang" (3656)); bred by Mr. W. Crawford, Chapel, Kilmalcolm, Renfrewshire; sire, "Prince Charlie" (629); dam, "Maggie" (1151) by "Lord Clyde" (2365).
- 154 EDWARD CHARLTON, Shaw House, Stocksfield-on-Tyne, Northumberland: the *Reserve Number* and *Highly Commended* for "Nanny," bay; was foaled in 1877 (foal by "Merry Monarch" (538)); bred by Mr. J. H. Jobling, Stamford, Alnwick, Northumberland; sire, "Hamilton Jock" (1151); dam, "Black Bess" (183), by "Young Merry Tom" (1001).

CLASS 15.—Suffolk Mares and Foals.

- 163 ROBERT R. WILMOT, Lilliput, Swansea, Glamorganshire: **FIRST PRIZE, 20*l.***, for "Vixen," chestnut; was foaled in 1881 (foal by "Verger"); bred by Mr. James Toller, Blaxhall, Wickham Market, Suffolk; sire, "Prince Imperial" (1239); dam, "Venus" (923), by "Hercules" (70).

CLASS 16.—Hunter Mares and Foals.

- 170 TEASDALE HILTON HUTCHINSON, Manor House, Catterick, Yorkshire: **FIRST PRIZE, 20*l.***, for "Achievement," bay, aged (foal by "Macaroon"); breeder and pedigree unknown.

- 166 HENRY KITCHING, Elm Field, Darlington: SECOND PRIZE, 10*l.*, for "Bondmaid," brown; was foaled in 1877 (foal by "Morocco"); bred by Mr. J. P. Adamson, Marske by the Sea, Yorks.; sire, "Bondaman;" dam, "Grace Darling," by "Young Hippolytus."
- 164 EDWARD BARTON, Warton Grange, Carnforth, Lancashire: THIRD PRIZE, 5*l.*, for "Matilda," brown; was foaled in 1870 (foal by "Carthusian"); bred by the Earl of Zetland, Aske Hall, Richmond, Yorks.; sire, "Vultigeur;" dam by "St. Bennett."
- 167 DAVID SWANSTON, Highfield Grange, Gainsborough, Lincolnshire: the *Reserve Number* and *Highly Commended* for "Shepherdess," chestnut; was foaled in 1876 (foal by "Discord"), breeder unknown; sire, "Mowbray;" dam by "Gin Sling."

CLASS 17.—*Hackney Mares and Foals.*

- 178 HENRY MOORE, Burn Butts, Cranswick, Hull: FIRST PRIZE, 15*l.*, for "Princess," chestnut; was foaled in 1879 (foal by "Lord Derby 2nd" (417)); bred by himself; sire, "Denmark" (177); dam, "Empress" (95), by "Fireaway" (249).
- 176 EDWARD BLOMFIELD HAMOND, Waterden, South Creak, Fakenham, Norfolk: SECOND PRIZE, 10*l.*, for "Lady Jane," grey, was foaled in 1877 (foal by "Cannon Ball" (113)), bred by Mr. W. Hamond, Peasthorpe, Fakenham; sire, "Hurdle," dam, "Grey Beauty," by "Prickwillow" (614).
- 172 THOMAS WELLS, Newland Tofts, Hull: the *Reserve Number* and *Highly Commended*, for "Dagmar," bay, was foaled in 1880 (foal by "Fashion" (199)), bred by Mr. Richardson, Rytham Gate, Pocklington, Yorkshire; sire, "Denmark" (177), dam by "Bounding Willow" (95).

CLASS 18.—*Pony Mares and Foals.*

- 187 EARL CAWDOR, Stackpole Court, Pembroke: FIRST PRIZE, 15*l.*, for "Mary Anne," brown; aged (foal by "Country Gentleman"); breeder unknown; sire, "Tom Moody."
- 186 WILLIAM BURBOW RAY, New Hotel, Clapham, Lancaster: SECOND PRIZE, 10*l.*, for "Judy," chestnut; aged (foal by "Sir Cupid"); bred by the late Mr. Homphray, Ingleton, Kirkby Lonsdale, Yorkshire.

CLASS 19.—*Shire or Agricultural Fillies foaled in the Year 1882.*

- 192 T. H. MILLER, Singleton Park, Poulton-le-Fylde: FIRST PRIZE, 15*l.*, for "Missing Link," bay; bred by himself; sire, "Lincoln" (1350); dam, "Jewel 2nd," by "Honest Tom" (1105).
- 198 THE EARL OF ELLESMERE, Worsley Hall, Manchester: SECOND PRIZE, 10*l.*, for "Nectar," bay; bred by Mr. A. E. Cooper, Ashby-de-la-Zouch; sire, "Nonpareil" (2470); dam by "Matchless" (1518).
- 199 TRASDALE HILTON HUTCHINSON, Manor House, Catterick, Yorkshire: THIRD PRIZE, 5*l.*, for chestnut; breeder unknown; sire, "Colonel."
- 191 T. H. MILLER, Singleton Park: the *Reserve Number* and *Highly Commended* for "Moulton Gem," bay; bred by Mr. A. H. Clark, Moulton Raigate, Spalding; sire, "Matchless Wonder" (2622); dam, "Stamp," by "Stonton" (2065).

CLASS 20.—*Shire or Agricultural Fillies foaled in the Year 1883.*

- 212 LORD WANTAGE, V.C., Lockinge Park, Wantage, Berkshire: **FIRST PRIZE**, 15*l.*, for "Glow," bay; bred by Mr. Walter Gilbey, Elsenham Hall, Essex; sire, "Spark" (2497); dam, "Carol," by "Honest Prince" (1058).
- 214 MESSRS. RICHARD WARING AND BROTHERS, Old House Farm, Catforth, Preston: **SECOND PRIZE**, 10*l.*, for "This is Her," bay; bred by themselves; sire, "What's Wanted" (2332); dam, "Smiler," by "Honest Tom" (1105).
- 204 THE HON. E. COKE, Longford, Derbyshire: **THIRD PRIZE**, 5*l.*, for "Comet," brown; bred by Mr. R. C. Palmer, Lodge Farm, Nazing, Waltham Cross, Essex; sire, "Spark" (2497); dam, "Depper."
- 210 EDWARD HOLMES, Crow Trees Farm, Bartle, Preston: the *Reserve Number* and *Highly Commended* for "May Blossom," chestnut; bred by Mr. Robert Illingworth, Daniels Farm, Whittingham, Preston, Lancashire; sire, "Waring's Wonder" (2688); dam, "Jessie," by "British Ensign" (272).

CLASS 21.—*Shire or Agricultural Fillies, foaled in the Year 1884.**

- 222 LORD WINMARLEIGH, Winmarleigh, Garstang: **FIRST PRIZE**, 15*l.*, for bay; bred by himself; sire, "Garnet" (2787); dam, "Winmarleigh Lass," by "Sir Colin" (2022).
- 226 T. H. MILLER, Singleton Park, Poulton-le-Fylde: **SECOND PRIZE**, 10*l.*, for his chestnut; bred by Messrs. Horrell, Thorney Fen, Peterborough; sire, "Mepal Samson" (2624); dam, "Thorney Blossom II.," by "Champion" (450).
- 235 THE EARL OF ELLESMERE, Ferry Hill Stud Farm, Chatteris, Cambridge-shire: **THIRD PRIZE**, 5*l.*, for "Bric-a-Brac," grey; bred by himself; sire, "Lincolnshire Lad 2nd" (1365); dam, "Queen Anne," by "Old England" (1680).
- 221 LORD WINMARLEIGH: the *Reserve Number* and *Highly Commended* for his bay; bred by himself; sire, "Cromwell" (2415); dam, "Annie," by "Hannibal" (992).

CLASS 22.—*Shire or Agricultural Filly Foals, the produce of Mares exhibited in Class 13.**

- 145* THE EARL OF ELLESMERE, Worsley Hall, Manchester: **FIRST PRIZE**, 15*l.*, for his black; bred by himself; sire, "Don Carlos" (2416); dam, "Lady Lincoln," by "Lincolnshire Lad 2nd" (1365).
- 125* THE HON. E. COKE, Longford, Derbyshire: **SECOND PRIZE**, 10*l.*, for his black; bred by himself; sire, "Charter" (2740); dam, "Comfort," by "What's Wanted" (3397).
- 139* WILLIAM JACKSON, Brick House, Pilling, Fleetwood, Lancashire: **THIRD PRIZE**, 5*l.*, for "Lady Sandy," bay; bred by himself; sire, "Royal Sandy" (3993); dam, "Bessie," by "Sir Colin" (2022).
- 141* MESSRS. RICHARD WARING AND BROTHERS, Old House Farm, Catforth, Preston: the *Reserve Number* and *Highly Commended* for their bay; bred by themselves; sire, "Royal Sandy" (3993); dam "Smiler," by "Honest Tom" (1105).

CLASS 23.—*Clydesdale Fillies foaled in the Year 1882.*

- 245 LORDS A. AND L. CECIL, Orchardmains, Innerleithen, Peebles-shire: **FIRST PRIZE, 15*l.***, for "Cornflower," bay; bred by Mr. Robert Frederick, Drumflower, Dunragit; sire, "Lord Lyon" (489); dam, "Young Mary of Drumflower" (519), by "Prince Charlie" (629).
- 250 JOHN WADDELL, Inch, Bathgate, N.B.: **SECOND PRIZE, 10*l.***, for "Nellie Macgregor," brown; bred by Mr. Robert Craig, Flashwood, Dalry, Ayrshire; sire, "Darnley" (222); dam, "Sally" (60), by "Prince Charlie" (629).
- 243 JOHN GIFFORD, Ingleston, Twynholm, Kirkcudbrightshire: **THIRD PRIZE, 5*l.***, for "Ella," brown; bred by Mr. James Gifford, Broadwater, Stevenage, Herts.; sire, "The Maister" (1846); dam, "Trim" (1268), by "Farmer" (286).
- 246 ALEXANDER McCOWAN, Newtownairs, Dumfries, N.B.: the *Reserve Number* and *Highly Commended* for "Rosewater," bay; bred by Mr. Robert Frederick, Drumflower, Dunragit; sire, "Lord Lyon" (489); dam, "Nell" (520), by "Farmer" (286).

CLASS 24.—*Clydesdale Fillies foaled in the Year 1883.*

- 258 LORDS A. AND L. CECIL, Orchardmains, Innerleithen, Peebles-shire: **FIRST PRIZE, 15*l.***, for "Edith Plantagenet," bay; bred by Mr. William Houston, Whiteleys, Dumbarton; sire, "Belted Knight" (1395); dam, "Lily of Whiteley" (2352), by "Topsman" (886).
- 261 THE DUKE OF PORTLAND, The Dean, Kilmarnock, N.B.: **SECOND PRIZE, 10*l.***, for "Loyalty," bay; bred by Mr. James Park, Dechmont, Hamilton, N.B.; sire, "Lord Erskine" (1744); dam, "The Twin" (625), by "Prince of Wales" (673); and (260) **THIRD PRIZE, 5*l.***, for "Dew Drop," brown; bred by Mr. James Drew, Nether Barr, Newton-Stewart, Wigtonshire, N.B.; sire, "Macgregor" (1487); dam, "Bell" (2150), by "Merry Tom" (536).
- 259 JAMES HUNTER, Coplawhill, Pollockshaws Road, Glasgow: the *Reserve Number* and *Highly Commended* for "Anita," brown; bred by himself; sire, "Darnley" (222); dam, "Janie" (791), by "Garibaldi" (317).

CLASS 25.—*Suffolk Fillies foaled in the Year 1882.*

- 265 CHARLES AUSTIN, Brandeston Hall, Wickham Market: **FIRST PRIZE, 15*l.***, for "Young Doughty," chestnut; sire, "Chieftain" (1354); dam, "Doughty" (986), by "Victor" (302); and (266) **SECOND PRIZE, 10*l.***, for "Young Scot," chestnut; sire, "Tiptop" (1367); dam, "Scot No. 2" (993), by "Commander" (1355); both bred by Mr. Jacob Walker, Loudham Hall Farm.

CLASS 26.—*Suffolk Fillies foaled in the Year 1883.*

- 270 THE DUKE OF HAMILTON AND BRANDON, K.T., Easton Park, Wickham Market: **FIRST PRIZE, 15*l.***, for "Matchless," chestnut; bred by himself; sire, "Statesman" (657); dam, "Smart" (430), by "Emperor" (279); and (269) **SECOND PRIZE, 10*l.***, for his chestnut; bred by the Duchess of Hamilton, Great Glemham, Saxmundham; sire, "Easton Emperor"; dam, "Scott," by "Cupbearer" (702).

CLASS 27.—*Pairs of Draught Mares or Geldings.**

- 272 THE EARL OF ELLESMERE, Worsley Hall, Manchester: FIRST PRIZE, 20*l.*, for "Acorn," bay mare; was foaled in 1880; bred by Mr. G. Mornington, Craven Arms, Salop; sire, "Heart of Oak" (1009). "Miss Stonton," bay mare; was foaled in 1880; bred by Mr. G. Chapman, Langham Lodge, Oakham; sire, "Stonton" (2065).
- 271 THE DUKE OF HAMILTON AND BRANDON, K.T., Easton Park, Wickham Market, Suffolk: SECOND PRIZE, 10*l.*, for "Belle of the Ball," chestnut mare; was foaled in 1874; bred by Mr. Frost, Wherstead, Ipswich, Suffolk. "Pride," chestnut mare; was foaled in 1881; bred by Mr. Alfred Preston, Worlingworth, Wickham Market; sire, "Cupbearer III.," dam, "Matchet," by "Prince."

CLASS 28.—*Draught Geldings.**

- 277 THE HON. MRS. MEYNELL-INGRAM, Temple Newsam, Leeds: FIRST PRIZE, 15*l.*, for "Bouncer," bay; was foaled in 1881; bred by Mr. G. Berridge, Castle Bytham, Rutland; sire, "Stonton" (2065).
- 278 JAMES CRONSHAW, the Firs, Gatley, Cheadle, Cheshire: SECOND PRIZE, 10*l.*, for "Robin," bay; was foaled in 1879; bred by Mr. John Bewley, The Grange, Great Stanney, Cheshire; sire, "Prince of Campsie," dam, "Queen," by "Old Glenell."
- 276 JOHN LAMB WAUGH, Seathill, Brampton, Cumberland: THIRD PRIZE, 5*l.*, for "Wallace," bay; was foaled in 1881; bred by himself; sire, "Prince Henry," dam, "Jess 2nd," by "Scotsman."
- 274 WILLIAM BRETHERTON, Sod Hall, Leyland, Preston: the *Reserve Number* and *Highly Commended* for "Jack," roan; was foaled in 1881; bred by Mr. Thomas Higham, Longton, Preston; sire, "Noah," dam by "Prince Imperial."

CLASS 29.—*Shire or Agricultural Mares foaled previously to or in the Year 1881, not having a foal at foot.**

- 79 THE HON. E. COKE, Longford, Derbyshire: FIRST PRIZE 15*l.*, for "Chance," black; was foaled in 1880; bred by Mr. William Lawrenson, Ash Farm, Preesall, Lancashire; sire, "Lincoln" (1350); dam, "Brock," by "Ploughboy" (1745).
- 282 TOMMY MILNE, Keel House, Brighouse, Yorkshire: SECOND PRIZE, 10*l.*, for "Daisy," bay; was foaled in 1879; bred by Mr. Thomas Dudding, Garthorpe, Goole, Yorkshire; sire, "Active" (54); dam, "Joan," by "Prince."
- 287 WILLIAM KIRKHAM, Barton Moss House, Manchester: THIRD PRIZE, 5*l.*, for "Flower," bay; was foaled in 1879; bred by himself; sire, "What's Wanted" (2332); dam, "Sal," by "King Alfred" (Shaw's).
- 286 WILLIAM RICHARDSON TROTTER, South Acomb, Stockfield-on-Tyne, Northumberland: the *Reserve Number* and *Highly Commended* for "Meg Moir," brown; was foaled in 1877; breeder unknown.

CLASS 30.—*Hunter Mares or Geldings, up to 15 stone, foaled previously to or in the Year 1880.**

- 291 ALEXANDER ALEXANDER, Spylaw Bank, Juniper Green, Midlothian: FIRST PRIZE, 30*l.*, for "Grenadier," grey gelding; was foaled in 1879; breeder unknown; dam by "Croton Oil."

- 293 JOHN NICHOLAS MAUGHAN, Newbrough Lodge, Fourstones, Northumberland: **SECOND PRIZE**, 15*l.*, for "Gamaster," chestnut gelding; was foaled in 1879; breeder unknown; sire, "Speculation."
- 289 WALTER CHILD HOLLINS, Willow Bridge Hall, Market Drayton: **THIRD PRIZE**, 10*l.*, for "Snowstorm, grey gelding; was foaled in 1877; breeder unknown.
- 288 CHRISTOPHER W. WILSON, Rigmaden Park, Kirkby Lonsdale, Westmoreland: the *Reserve Number* and *Highly Commended* for "Lord Penzance," chestnut gelding; was foaled in 1880; bred by Mr. John Weston, Endyeat, Endmoor, Westmoreland; sire, "Lord Penzance;" dam, "Credit," by "Best Returns."

CLASS 31.—Hunter Mares or Geldings, up to 12 stone, foaled previously to or in the Year 1880.*

- 303 JAMES RUSSEL, Dundas Castle, South Queensferry, Linlithgowshire: **FIRST PRIZE**, 30*l.*, for "Carabineer," bay gelding; was foaled in 1878; breeder unknown; sire, "Carabineer."
- 304 VICTOR VERASIS BRANFORD, of 22, Clarence Street, Edinburgh: **SECOND PRIZE**, 15*l.*, for "The Vauban," bay gelding; was foaled in 1876; breeder unknown; sire, "Vauban."
- 307 JOHN NICHOLAS MAUGHAN, Newbrough Lodge, Fourstones, Northumberland: **THIRD PRIZE**, 10*l.*, for "Royal Monarch," chestnut gelding; was foaled in 1876; breeder unknown; sire, "Monarch of the Glen;" dam by "Macaroni."
- 314 ANDREW JOHN BROWN, North Elmshall Hall, Pontefract, Yorkshire: the *Reserve Number* and *Highly Commended* for his bay gelding; was foaled in 1880; bred by Mr. Onerl, Wexford; sire, "Lothario;" dam by "Chit Chat."

CLASS 32.—Hunter Mares or Geldings foaled in the Year 1881.*

- 324 ANDREW JOHN BROWN, North Elmshall Hall, Pontefract: **FIRST PRIZE**, 30*l.*, for his bay gelding; bred by Mr. Murphy, Churchtown, co. Cork; sire, "Zephyrus."
- 319 JOHN LETT, Scampston, Yorkshire: **SECOND PRIZE**, 15*l.*, for "Spic and Span," brown gelding; bred by Mr. Martin, Worcester.
- 316 ROBERT MASON, Marsh Grange, Kirkby-in-Furness, Lancashire: **THIRD PRIZE**, 10*l.*, for "Randolph," bay gelding; bred by himself; sire, "Pioneer;" dam, "Kate," by "The Monk."
- 320 JOHN NICHOLAS MAUGHAN, Newbrough Lodge, Fourstones, Northumberland: the *Reserve Number* and *Highly Commended* for "Woodlark," chestnut gelding; bred by Mr. James Hedley, Bellingham, Northumberland; sire, "Lord Lisburn."

CLASS 33.—Hunter Mares or Geldings foaled in the Year 1882.*

- 329 THOMAS TOMLINSON, Bailiffgate, Alnwick, Northumberland: **FIRST PRIZE**, 20*l.*, for "Dauntless," bay gelding; bred by the late Mr. W. Archbold, Broomhouse, Alnwick; sire, "Festival;" dam, "Peeress," by "Pine Apple."
- 340 THOMAS TAYLOR, Addington Kellet, Carnforth, Lancashire: **SECOND PRIZE**, 10*l.*, for "Sam," brown gelding; bred by himself; sire, "Carthusian;" dam by "Fisherman."

- 338 JAMES WILSON, Esp Ford, Crosthwaite, Kendal, Westmoreland: **THIRD PRIZE**, 5*l.*, for "Clarion," bay gelding; bred by himself; sire, "Claremont;" dam, "Jessie," by "Ghilie Callum."
- 328 H. B. BOARDMAN, Thorn Leigh, Burton, Westmoreland: the *Reserve Number* and *Highly Commended* for "Blackthorn," brown mare; breeder unknown; sire, "Highborn;" dam by "King Brian."

CLASS 34.—Hunter Mares or Geldings foaled in the Year 1883.*

- 356 CHRISTOPHER STEPHENSON, Haworth, Brampton, Cumberland: **FIRST PRIZE**, 15*l.*, for "Sheraton," bay gelding; bred by Mr. G. T. Carr, Silloth, Cumberland; sire, "Gladstone;" dam by "Darlington."
- 358 RICHARD PERCIVAL, Burgh by Sands, Carlisle, Cumberland: **SECOND PRIZE**, 10*l.*, for "Harmonium," chestnut gelding; bred by himself; sire, "Golden Horn;" dam, "Ruby," by "Laughingstock."
- 352 JAMES AND GEORGE SEED, Yealand Hall, Carnforth, Lancashire: **THIRD PRIZE**, 5*l.*, for their brown gelding; bred by themselves; sire, "Carthusian."
- 360 ANDREW JOHN BROWN, North Elmsall Hall, Pontefract, Yorkshire: the *Reserve Number* and *Highly Commended* for his bay gelding; bred by Capt. Armstrong, Chaffpool, Ballymole, co. Sligo; sire, "Sir George;" dam by "Artillery."

CLASS 35.—Harness Mares or Geldings foaled previously to or in the Year 1882.*

- 361 HENRY FRISBY, 14, James Street, Buckingham Gate, London: **FIRST PRIZE**, 15*l.*, for "Movement," skewbald mare; was foaled in 1877; bred by Mr. Cooke, Litcham, Norfolk; sire, "Washington."
- 366 COLONEL LE GENDRE N. STARKIE, Huntroyd, Burnley, Lancashire: **SECOND PRIZE**, 10*l.*, for "Sunbeam," bay gelding; was foaled previous to 1882; breeder unknown.
- 367 E. G. HOTHERSALL, Lightfoot House, Broughton, Preston: **THIRD PRIZE**, 5*l.*, for "Prince," brown gelding; was foaled in 1882; bred by Mr. Pooley, York; sire, "Denmark;" dam by "Lord Derby."
- 363 T. H. MILLER, Singleton Park, Poulton-le-Fylde, Lancashire: the *Reserve Number* for "Jumping Mosses," chestnut gelding; was foaled in 1879; bred by himself; sire, "The Squire;" dam, "Jog Trot," by "Sir Harry."

CLASS 36.—Harness Mares or Geldings foaled in the Year 1883.*

- 370 JOHN CASTLEHOW TOPPIN, Musgrave Hall, Penrith, Cumberland: **FIRST PRIZE**, 15*l.*, for "Lady Laura," roan mare; bred by himself; sire, "Gladstone."
- 372 HENRY FISHER, Fox Lane Ends, Kirkham, Lancashire: **SECOND PRIZE**, 10*l.*, for his bay mare; bred by himself; sire, "Mulatto;" dam, "Nellie," by "Titan."

CLASS 37.—Hackney or Roadster Mares or Geldings up to not less than 15 stone.*

- 375 CHRISTOPHER W. WILSON, Rigmarden Park, Carnforth: **FIRST PRIZE**, 20*l.*, for "Lady Watton," brown mare, aged, bred by Mr. John Nicholson, Watton Grange, Driffild; sire, "Denmark."
- 377 JOHN ROBINSON, Cleavland House, Coltman Street, Hull: **SECOND PRIZE**, 10*l.*, for "Princess," chestnut mare, was foaled in 1880; bred by Mr. A. Fewson, Hedon, Hull, Yorkshire; sire, "Lord Derby."

Award of Live-Stock Prizes at Preston.

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- 374 H. B. BOARDMAN, Thorn Leigh, Burton, Westmoreland: **THIRD PRIZE**, 5*l.*, for "Vandal," chestnut gelding, was foaled in 1880; bred by Mr. Fewson, of Hull, Yorkshire; sire, "Phenomenon;" dam by "Denmark."
- 376 EDWARD BLOMFIED HAMOND, Waterden, Fakenham, Norfolk: the *Reserve Number* for "Kitty," bay mare; was foaled in 1880; bred by himself; sire, "Confidence" (158); dam, "Lady Jane" by "Ellis's Hurdle."

CLASS 38.—Hackney or Roadster Mares or Geldings up to not less than 12 stone.*

- 383 HENRY FRISBY, 14, James Street, Buckingham Gate, London: **FIRST PRIZE**, 20*l.*, for "Cardiff," bay gelding; was foaled in 1878; breeder unknown; sire, "Southampton;" dam by "Astonisher."
- 384 JOHN ROBINSON, Cleavland House, Coltman Street, Hull: **SECOND PRIZE**, 10*l.*, for "Lady Julia," black mare; was foaled in 1879; bred by Mr. Leake, Kettledrum, South Cave, Brough, Yorkshire; sire, "Lord Derby;" dam by "Denmark": and (386) **THIRD PRIZE**, 5*l.*, for "Lady Shrewsbury," black mare; was foaled in 1879; bred by Mr. Percy, Tibthorpe Wold, Driffeld, Yorkshire; sire, "Duke of Connaught;" dam by "Charles."
- 387 MARK PEARSON, Knaresborough, Yorkshire: the *Reserve Number* for "Jersey Lily," chestnut mare; was foaled in 1881; bred by Mr. J. Clarkson, Smylett Hall, Pocklington, Yorkshire; sire, "Denmark;" dam by "Old Performer."

CLASS 39.—Hackney or Roadster Mares or Geldings 13 hands 2 inches, and not exceeding 14 hands 2 inches.

- 391 WILLIAM POPE, Cannon House, Downham Market, Norfolk: **FIRST PRIZE**, 15*l.*,† for "Magpie," black and white mare; was foaled in 1870; bred by Mr. Cook, Litcham, Norfolk; sire "Youngman's Confidence."
- 393 HENRY FRISBY, 14, James Street, Buckingham Gate, London: **SECOND PRIZE**, 10*l.*,† for "Sovereign," brown mare; was foaled in 1880; bred by Mr. M. Harrison, Garten, Driffeld, Yorkshire; sire, "Denmark;" dam, "Lady Jane," by "Fireaway."
- 392 WILLIAM POPE, Cannon House: **THIRD PRIZE**, 5*l.*,* for "Maritana," brown mare; was foaled in 1870; breeder unknown; sire, "Don Carlos."
- 396 JOHN ROBINSON, Cleavland House, Coltman Street, Hull: the *Reserve Number* for "Lord Zetland," bay gelding; was foaled in 1880; breeder unknown; sire, "Lord Derby."

CLASS 40.—Hackney or Roadster Mares or Geldings not exceeding 13 hands 2 inches.

- 408 JOHN WILSON, 7, Bentley Road, Liverpool: **FIRST PRIZE**, 15*l.*,† for "Relish," brown gelding; was foaled in 1880; breeder unknown.
- 405 MISS MABEL ROBINSON, 10, Lansdown Street, Anlaby Road, Hull: **SECOND PRIZE**, 10*l.*,† for her chestnut mare; was foaled in 1879; breeder unknown.
- 404 T. H. MILLER, Singleton Park, Poulton-le-Fylde, Lancashire: **THIRD PRIZE**, 5*l.*,* for "Magpie," skewbald gelding; was foaled in 1878; breeder unknown.

† Given by the Borough of Blackpool.

CATTLE.

CLASS 41.—*Shorthorn Bulls calved in either 1880 or 1881.*

- 411 WILLIAM CHAPMAN, Trewithian House, Gertans, Gramscund Road, Cornwall: FIRST PRIZE, 25*l.*, for "Earl of Oxford," white; was calved September 1st, 1880; bred by himself; sire, "Master Frederick" (38,729); dam, "Laburnum," by "Lord Oxford" (29,189); g. d., "Laurel Leaf 2nd," by "Baronet" (27,929); gr. g. d., "Laurel Bough," by "Statesman" (25,231); gr. g. g. d., "Laurel Leaf," by "Victory" (17,186).
- 413 WILLIAM HANDLEY, Green Head, Milnthorpe, Westmoreland: SECOND PRIZE, 15*l.*, for "Self Esteem 2nd" (48,675), roan; was calved September 9th, 1881; bred by Sir William C. Worsley, Bart., Hovingham, York; sire, "Hovingham" (43,363); dam, "Trusty Lass," by "Sir Robin" (40,720); g. d., "Conceit," by "Earl of Derby" (21,638); gr. g. d., "Confidence," by "Wizard of Windsor" (21,124); gr. g. g. d., "Trust," by "Sir Charles" (16,949).
- 410 JOHN THOMAS BAKER, Colville House, Wisbech, Cambridgeshire: THIRD PRIZE, 10*l.*, for "Paulowitz" (46,845), roan; was calved June 22nd 1881; bred by Sir C. F. Smythe, Bart., Acton Burnell, Shrewsbury; sire, "Paul Potter" (38,854); dam, "Blanche Violante," by "Oxford Beau 3rd" (32,013); g. d., "Violante's Butterfly," by "Royal Butterfly" (16,862); gr. g. d., "Violante," by "Valiant" (10,989); gr. g. g. d., "Roan Duchess 2nd," by "Frederick" (11,489).
- 417 WILLIAM HENRY WAKEFIELD, Sedgwick, Kendal, Westmoreland: the *Reserve Number and Highly Commended* for "Baron Sedgwick" (35,541), roan; was calved January 30th, 1880; bred by himself; sire, "Baron Barrington 4th" (33,006); dam, "Well Heads Rose 2nd," by "Sir Arthur Windsor" (35,541); g. d., "Well Heads Rose," by "Dunrobin" (28,486); gr. g. d., "Rosebud 2nd," by "Albert Victor" (23,293); gr. g. g. d., "Rosebud 1st," by "Squire Stuart" (20,891).

CLASS 42.—*Shorthorn Bulls calved in the Year 1882.*

- 419 ROBERT THOMPSON, Inglewood, Penrith, Cumberland: FIRST PRIZE, 25*l.*, for "Royal Baron," roan; was calved June 1st; bred by himself; sire, "Beau Benedict" (42,769); dam, "Lady Red Stockings," by "Golden Duke" (36,705); g. d., "Lady White Stockings," by "Edgar" (19,680); gr. g. d., "Village Girl," by "Hamlet" (18,017); gr. g. g. d., by "Eclipse" (17,791).
- 422 WILLIAM COOMER, Chorlton, Nantwich, Cheshire: SECOND PRIZE, 15*l.*, for "Sir Stafford" (48,747), red; was calved February 2nd; bred by Mr. W. Shaw, Whittingham Hall, Preston; sire, "Romulus" (45,487); dam, "Diana 2nd," by "Grand Duke of Oxford 3rd" (31,295); g. d., "Diana," by "Prince of Lancaster" (22,616); gr. g. d., "Mary 5th," by "Duke of Roseberry" (15,943); gr. g. g. d., "Mary 4th," by "Burgundy" (7861).

CLASS 43.—*Shorthorn Bulls calved in the Year 1883.*

- 430 WILLIAM HANDLEY, Green Head, Milnthorpe, Westmoreland: FIRST PRIZE, 25*l.*, and the CHAMPION PRIZE, 25*l.*,† for "Royal Ingraham" (50,374), red and white; was calved January 6th; bred by himself; sire, "Sir

† Given by the Shorthorn Society.

- Arthur Ingram" (32,490); dam, "Harmony," by "Sir Arthur Windsor" (35,541); g. d., "Hannah," by "Prince Arthur" (29,597); gr. g. d., "White Ammons," by "Sir Walter Trevelyan" (25,179); gr. g. g. d., by "General Garibaldi" (21,813).
- 431 **MATTHEW RUDSDALE**, Danby Church House, Castleton, Yorks.: **SECOND PRIZE**, 15*l.*, for "Lord Salisbury," roan; was calved October 27th; bred by Mr. Jonathan Hartley, Loftus Mill, Loftus, Saltburn-by-the-Sea; sire, "Tregunter Chesham" (48,831); dam, "White Lily," by "Royal James" (40,639); g. d., "Young Patty," by "Waxwork" (23,199); gr. g. d., "Patty," by "Prince of I." (35,499); gr. g. g. d., "Rose of Shamrock," by "Sepoy" (35,499).
- 435 **CHARLES WILLIAM BRIERLEY**, Rosedale, Tenbury, Worcestershire: **THIRD PRIZE**, 10*l.*, for "Ruckley," white; was calved May 23rd; bred by the late Mr. S. L. Horton, Park House, Shifnal, Salop; sire, "Prince Saturn" (46,926); dam, "Constance Doon," by "Marquis of Blandford 6th" (41,983); g. d., "Lorna Doon," by "Abacot" (32,900); gr. g. d., "Ellie," by "Prince Albert" (18,579); gr. g. g. d., "Rose of Midsummer," by "Sir Colin" (15,276).
- 442 **GEORGE COOKE**, Clayley Hall, Handley, Cheahire: the *Reserve Number* and *Highly Commended* for "Sea Captain," red and white; was calved March 29th; bred by Mr. J. W. Faux, Coleorton, Ashby-de-la-Zouch; sire, "Sea Urchin" (48,678); dam, "May Bagot," by "Ryton;" g. d., "Miss Bagot 2nd," by "Coton" (21,488); gr. g. d., "Miss Bagot," by "Croydon" (17,623); gr. g. g. d., "Lucia," by "Vatican" (12,261).

CLASS 44.—Shorthorn Bulls, calved in the Year 1884.

- 448 **THE DUKE OF NORTHUMBERLAND**, Alnwick Castle, Northumberland: **FIRST PRIZE**, 25*l.*, for "Hopewell," roan; was calved January 25th; bred by Mr. William Taylor, New House, Burneside, Kendal, Westmoreland; sire, "Sir Arthur Irwin" (44,016); dam, "Miss Hopewell," by "Master Hopewell" (40,325); g. d., "Belle of Burnside," by "Major Irwin" (34,735); gr. g. d., "Belle of Greengill," by "Marplot's Farewell" (34,767); gr. g. g. d., "Fortune's Farewell," by "Marplot" (22,291).
- 455 **WILLIAM HANDLEY**, Green Head, Milnthorpe, Wstmorland: **SECOND PRIZE**, 15*l.*, for "Golden Treasure," roan; was calved March 22nd; bred by himself; sire, "Sir Arthur Ingram" (32,490); dam, "Princess Flora," by "Alfred the Great" (36,121); g. d., "Earl's Flora," by "Earl of Eglinton" (23,832); gr. g. d., "Flora Cobham," by "Marquis of Cobham" (22,299); gr. g. g. d., "Flower of Fitz-Clarence," by "Alfred Fitz-Clarence" (19,215).
- 457 **THE DUKE OF DEVONSHIRE**, K.G., of Holker Hall, Cark-in-Cartmel, Carnforth, Lancashire: **THIRD PRIZE**, 10*l.*, for "Baron Oxford 18th," roan; was calved April 7th; bred by himself; sire, "Duke of Oxford 62nd" (47,778); dam, "Baroness Oxford 11th," by "Duke of Connaught" (33,604); g. d., "Baroness Oxford," by "Second Duke of Claro" (21,576); gr. g. d., "Lady Oxford 5th," by "Third Duke of Thorndale" (17,749); gr. g. g. d., "Lady Oxford 4th," by "Grand Duke 2nd" (12,961).
- 448 **CHARLES ROBERT BREACH** and **CHARLES WALKER COUPLAND**, Colehurst, Combe Fields, Rugby, Warwickshire: the *Reserve Number* and *Highly Commended* for "Confidence," roan; was calved June 20th; bred by Mr. John T. Story, Hooton Roberts, Rotherham; sire, "Self Esteem 2nd" (48,675); dam, "Cherry Bracelet," by "Ben Brace" (30,524); g. d., "Bracelet," by "Major" (24,513); gr. g. d., "Mirthful," by "Shan O'Neil" (25,120); gr. g. g. d., "Cheerful," by "Warlock" (19,113).

CLASS 45.—Shorthorn Cows, in-milk or in-calf, calved previously to or in the Year 1881.

- 477 **THE DUKE OF NORTHUMBERLAND**, Alnwick Castle, Northumberland: **FIRST PRIZE, 20*l.***, for "Rosebud 12th," roan; was calved December 15th, 1877, in-milk; calved October 25th, 1884, and in-calf; sire, "Fitz-Roland" (33,936); dam, "Rosebud 12th," by "Hotspur" (28,876); g. d., "Rosebud 11th," by "Brigand" (28,080); gr. g. d., "Rosebud 7th," by "Snowflake" (18,888); gr. g. d., "Rosebud 2nd," by "Duke of Buckingham" (14,429); and (476) **SECOND PRIZE, 10*l.***, for "Mountain Daisy," roan; was calved February 17th, 1881; calved April 15th, 1884, and in-calf; sire, "Sir Raymond" (40,716); dam, "Sweet Daisy," by "Duke of Tyne" (33,744); g. d., "Red Daisy," by "Jeweller" (26,460); gr. g. d., "Woodbine," by "Vice President" (23,125); gr. g. g. d., "Rosebud," by "Majestic" (13,279); both bred by himself.
- 472 **JOHN JERVIS SHARP**, Broughton, Kettering: **THIRD PRIZE, 5*l.***, for "May Duchess 15th," red; was calved June 21st, 1879, in-milk; calved October 15th, 1884, and in-calf; bred by himself; sire, "Duke of Darlington 4th" (38,138); dam, "May Duchess 14th," by "Imperial Oxford" (36,785); g. d., "May Duchess 11th," by "Earl of Oxford" (21,651); gr. g. d., "May Duchess 4th," by "Earl of Oxford" (21,651); gr. g. g. d., "May Duchess," by "Grand Duke of York" (12,966).
- 473 **CHARLES WILLIAM BRIERLEY**, Rosedale, Tenbury, Worcestershire: the *Reserve Number* and *Highly Commended* for "Snowflake," white; was calved September 11th, 1878; calved January 10th, 1884, and in-calf; bred by himself; sire, "Bolivar's Farewell" (33,173); dam, "Bolivar's White Tulip," by "Bolivar" (25,649); g. d., "Tulip Flower," by "Lord Albert" (20,143); gr. g. d., "Rachel," by "Monarch" (18,412); gr. g. g. d., "Young Matchless," by "Duke of Tyne" (12,773).

CLASS 46.—Shorthorn Cows or Heifers, in-milk or in-calf, calved in the Year 1882.

- 483 **BENJAMIN ST. JOHN ACKERS, M.P.**, Prinknash Park, Painswick, Gloucestershire: **FIRST PRIZE, 20*l.***, and the **CHAMPION PRIZE, 25*l.***,† for "Lady Carew 13th," roan; was calved August 10th; in-calf; bred by himself; sire, "Royal Gloucester" (45,525); dam, "Lady Carew 5th," by "Lord Prinknash 2nd" (38,653); g. d., "Lady Jane," by "Baron Killerby" (23,364); gr. g. d., "Miracle," by "Prince James" (20,554); gr. g. g. d., "Heather Bell," by "Hero" (18,055).
- 481 **ROBERT THOMPSON**, Inglewood, Penrith, Cumberland: **SECOND PRIZE, 10*l.***, for "Inglewood Belle," roan; was calved January 3rd; in-calf; bred by himself; sire, "Beau Benedict" (42,769); dam, "Inglewood Pet," by "Brilliant Butterfly" (36,270); g. d., "Love Token," by "Grand Duke of Fawsley 3rd" (31,286); gr. g. d., "Farewell," by "Royal Westmoreland" (35,416); gr. g. g. d., "General's Daughter," by "General Haynau" (11,520).
- 485 **CHARLES WILLIAM BRIERLEY**, Rosedale, Tenbury, Worcestershire: **THIRD PRIZE, 5*l.***, for "Rosedale Duchess," roan; was calved April 26th, due to calve May 2nd, 1885; bred by Mr. J. J. Sharp, Broughton, Kettering; sire, "Baron Shendish 5th" (44,374); dam, "May Duchess 15th," by "Duke of Darlington 4th" (38,138); g. d., "May Duchess 14th," by "Imperial Oxford" (36,785); gr. g. d., "May Duchess 11th," by "Earl of Oxford" (21,651); gr. g. g. d., "May Duchess 4th," by "Earl of Oxford" (21,651).

† Given by the Shorthorn Society.

- 480 JOHN GARNE, Great Rissington, S. O., Gloucestershire: the *Reserve Number* and *Highly Commended* for "Broadmoor Foggathorpe," red; was calved October 14th; calved September 2nd, 1884, and in-calf; bred by himself; sire, "Broadmoor Prince" (44,478); dam, "Oxford Foggathorpe," by "11th Duke of Oxford" (19,632); g. d., "Mrs. Fagan," by "Sir Rainald" (27,485); gr. g. d., "Gross Lind," by "Trafalgar" (23,086); gr. g. g. d., "Lady Lind," by "Baron Lind" (17,374).

CLASS 47.—*Shorthorn Cows, with not less than Two of their Offspring.**

- 493 JOHN JERVIS SHARP, Broughton, Kettering, Northamptonshire: **FIRST PRIZE, 20L.**, for "Julia 14th," roan; was calved July 31st, 1876; bred by himself; sire, "Claro's Rose" (25,784); dam, "Julia 10th," by "Lord Seagrave" (26,736); g. d., "Julia 9th," by "Lord Chancellor" (20,160); gr. g. d., "Julia 1st," by "Henry 5th" (19,944).

Offspring, bred by himself.

(1) "Julia 21st," roan; was calved January 31st, 1881; sire, "Baron Shendish 5th" (44,374).

(2) "Joyul," white; was calved September 28th, 1883; sire, "Baron Shendish 5th" (44,374).

(3) "Jubilant," red; was calved October 14th, 1884; sire, "Oxford Rose 3rd" (50,135).

- 496 TREASDALE H. HUTCHINSON, Manor House, Catterick, Yorkshire: **SECOND PRIZE, 10L.**, for "Lady Gray," roan; was calved July 3rd, 1879; bred by himself; sire, "British Knight" (33,220); dam, "Lady Grace," by "K. C. B." (26,492); g. d., "Lady Graceful," by "Knight Errant" (18,154); gr. g. d., "Lady of the Manor," by "Baron Warlaby" (7813).

Offspring, bred by himself.

(1) "Lady Golightly," roan; was calved November 28th, 1883; sire, "Riby Star" (46,983).

(2) "Lord Gordon," roan; was calved January 7th, 1885; sire, "Riby Star" (46,983).

- 492 ROBERT THOMPSON, Inglewood, Penrith: **THIRD PRIZE, 5L.**, for "Inglewood Pet," roan; was calved October 7th, 1878; bred by himself; sire, "Brilliant Butterfly" (36,270); dam, "Love Token," by "Grand Duke of Fawsley 3rd" (31,286); g. d., "Farewell," by "Royal Westmoreland" (35,416); gr. g. d., "General's daughter," by "General Haynau" (11,520).

Offspring, bred by himself.

(1) "Inglewood Pride," roan; was calved December 24th, 1883; sire, "Beau Benedict" (42,769).

(2) "Inglewood Beau," roan; was calved January 30th, 1885; sire, "Beau Benedict" (42,769).

- 497 WILLIAM AND THOMAS TAYLOR, Hall Garth, Kirkby Stephen, Westmoreland: the *Reserve Number* and *Highly Commended* for "Lady of Nunwick 2nd," roan; was calved February 20th, 1875; bred by Mr. J. Lamb, Burrell Green, Penrith; sire, "Hubback Junior" (31,395); dam, "Lady of Nunwick," by "Lord of Nunwick" (26,702); g. d., "Cherry Blossom," by "Lieutenant" (18,198); gr. g. d., "Dahlia," by "Duke" (14,421).

Offspring, bred by themselves.

(1) "Prince Oxford," roan, was calved November 4th, 1880; sire, "Prince Louis" (42,189).

(2) "Prince of Nunwick," roan; was calved December 13th, 1883; sire, "Prince Louis" (42,189).

(3) "Prince Arthur," white; was calved December 1st, 1884; sire, "Lord Ormskirk Gwynne" (41,905).

CLASS 48.—*Shorthorn Heifers calved in the Year 1883.*

- 499 MRS. MCINTOSH, Havering Park, Romford, Essex: **FIRST PRIZE**, 20*l.*, for "Havering Nonpareil 2nd," roan; was calved June 30th; bred by herself; sire, "Baron Gwynne 2nd" (44,350); dam, "Telemacina 2nd," by "Telemachus 6th" (35,725); g. d., "Telemacina," by "Telemachus" (27,603); gr. g. d., "Lady Penrhyn," by "Third Duke of Wharfedale" (21,619); gr. g. d., "Nonpareil 21st," by "Duke of Geneva" (19,614).
- 510 CHARLES WILLIAM BRIERLEY, Rosedale, Tenbury, Worcestershire: **SECOND PRIZE**, 10*l.*, for "Rosedale Snowflake," roan; was calved January 6th; bred by himself; sire, "Rosedale Oxford" (48,597); dam, "Snowflake," by "Bolivar's Farewell" (33,173); g. d., "Bolivar's White Tulip," by "Bolivar" (25,649); gr. g. d., "Tulip Flower," by "Lord Albert" (20,143); gr. g. d., "Rachel," by "Monarch" (18,412).
- 500 JOHN GARNE, Great Rissington, S. O., Gloucestershire: **THIRD PRIZE**, 5*l.*, for "Lady Ebury," roan; was calved June 3rd; bred by himself; sire, "Sir Robert Seal" (48,741); dam, "Epithet 2nd," by "Sir Robert Frogmore" (40,719); g. d., "Epitaph 27th," by "Numa" (34,931); gr. g. d., "Epitaph 25th," by "Colesbourne" (30,757); gr. g. d., "Epitaph 17th," by "Purple Emperor" (27,222).
- 517 F. J. SAVILE FOLJAMBE, M.P., Osberton Hall, Worksop, Notts.: the *Reserve Number* and *Highly Commended* for "Queen Esther," roan; was calved January 1st; bred by himself; sire, "King Roderick" (44,999); dam, "Circassian Slave," by "Sir Andrew" (42,387); g. d., "White Slave," by "Heirloom" (34,125); gr. g. d., "Topsy 4th," by "Stanley" (17,036); gr. g. d., "Topsy 2nd," by "Royal Master Butterfly 2nd" (29,872).

CLASS 49.—*Shorthorn Heifers calved in the Year 1884.*

- 528 WILLIAM HOSKEN AND SON, Loggans Mill, Hayle, Cornwall: **FIRST PRIZE**, 20*l.*, for "Alexandria 9th," roan; was calved January 2nd; bred by themselves; sire, "Grand Duke of Oxford 5th" (43,318); dam, "Alexandria 5th," by "Prince of Oxford" (42,212); g. d., "Alexandria," by "Second Earl of Oxford" (23,844); gr. g. d., "Maid of Athens," by "Sir Richard" (15,298); gr. g. d., "Miss Bloomer," by "Siddington Duke" (15,263).
- 525 THE DUKE OF PORTLAND, Clipstone Park Farm, Mansfield, Notts.: **SECOND PRIZE**, 10*l.*, for "Queen of the Cressida's 3rd," roan; was calved February 16th; bred by himself; sire, "Grand Ruth" (46,459); dam, "Queen of the Cressida's," by "Prince Frederick" (35,110); g. d., "Crocus," by "Wollesley" (25,421); gr. g. d., "Cress," by "Paul Pry" (20,478); gr. g. d., "Cressida," by "Sir John" (12,084).
- 535 TEASDALE HILTON HUTCHINSON, Manor House, Catterick, Yorkshire: **THIRD PRIZE**, 5*l.*, for "Victoria Formosa," roan; was calved May 6th; bred by himself; sire, "Riby Star" (46,983); dam, "Victoria Frigida," by "Janus" (34,245), or "Heart of Oak" (39,982); g. d., "Victoria Candida," by "Royal Commander" (29,857); gr. g. d., "Victoria Septima," by "Bythis" (25,700); gr. g. d., "Victoria Quinta," by "Ravenshope" (22,681).

- 530 HERBERT LENEX, Blacklands, East Malling, Kent: the *Reserve Number* and *Highly Commended* for "Belle Blanche," red; was calved January 15th; bred by himself; sire, "Kirklevington Duke 2nd"; dam, "Sockburnia 3rd," by "Sixth Duke of Oneida" (30,997); g. d., "Cherry Blanche 3rd," by "Baron Westwater" (30,492); gr. g. d., "Cherry Blanche 2nd," by "Charleston" (21,400); gr. g. g. d., "Cherry Blanche," by "Cherry Duke 4th" (17,552).

CLASS 50.—Hereford Bulls calved in either 1880 or 1881.

- 540 JOHN PRICE, Court House, Pembridge, Herefordshire: **FIRST PRIZE**, 25l., for "Hotspur"; was calved May 24th, 1881; bred by himself; sire, "Regulus" (4076); dam, "Spot," by "Horace 2nd" (4655); g. d., "Spot," by "Cholstrey" (1918); gr. g. d., "Spot," by "Lord Clyde" (2048); gr. g. g. d., "Spot," by "Son of Kohinore" (825).
- 539 THE EARL OF COVENTRY, Croome Court, Severn Stoke, Worcestershire: **SECOND PRIZE**, 15l., for "Good Boy" (7668); was calved November 28th., 1881; bred by himself; sire, "Fisherman" (5913); dam, "Giantess," by "Sir Roger" (4133); g. d., "Haidee," by "Battenhall" (2406); gr. g. d., "Diana," by "Carbonel" (1525); gr. g. g. d., "Y. Dainty," by "Doctor" (1083).

CLASS 51.—Hereford Bulls calved in the Year 1882.

- 543 HERBERT RICHARD HALL, Holme Lacy, Hereford: **FIRST PRIZE**, 25l., for "Hotspur" (7726); was calved July 6th; bred by the late Mr. T. J. Carwardine, Stockton Bury, Leominster, Herefordshire; sire, "Lord Wilton" (4740); dam, "Rosaline," by "De Cote" (3060); g. d., "Gentle," by "Heart of Oak" (2035); gr. g. d., "Theresa," by "Counsellor" (1939); gr. g. g. d., "Pink," by "Titterstone" (1775).

CLASS 52.—Hereford Bulls calved in the Year 1883.

- 548 HENRY WILLIAM TAYLOR, Showle Court, Ledbury, Herefordshire: **FIRST PRIZE**, 25l., for "Maidstone" (8876); was calved April 20th; bred by himself; sire, "Franklin" (6961); dam, "Duchess 4th," by "Tredegar" (5077); g. d., "Duchess," by "Twin" (2284); gr. g. d., "Duchess," by "Alma" (1144); gr. g. g. d., "Victoria," by "Prince Albert" (686).
- 544 JAMES RANKIN, M.P., Bryngwyn, Tram Inn, R. S. O., Herefordshire: **SECOND PRIZE**, 15l., for "Royal Grove" (9157); was calved September 30th; bred by himself; sire, "Grove 3rd" (5051); dam, "Duchess 2nd," by "Spartan" (5009); g. d., "Duchess," by "Provost" (4067); gr. g. d., "Gwendoline," by "Franky"; gr. g. g. d., "Geraldine," by "Bolingbroke."
- 547 WILLIAM TUDGE, Leinthall, Ludlow: **THIRD PRIZE**, 10l., for "Leinthall" (8801); was calved March 3rd; bred by himself; sire, "Auctioneer" (5194); dam, "Roseleaf," by "Lord Hythe" (3937); g. d., "Rosebud," by "Sir Thomas" (2228); gr. g. d., "Rose," by "North Star" (2138); gr. g. g. d., "Rose," by "The Grove" (1764).
- 549 CHARLES NOTT, Bury House, Wigmore, Kingsland, R. S. O., Herefordshire: the *Reserve Number* and *Highly Commended* for "Masterman"; was calved June 21st; bred by himself; sire, "Marquis" (6057); dam, "Tichborne," by "Commander" (4452); g. d., "Tichborne," by "Governor" (3137); gr. g. d., "Dowager," by "Orleton" (3294); gr. g. g. d., "Dowager," by "Pollox" (2163).

CLASS 53.—Hereford Bulls calved in the Year 1884.

- 556 JAMES RANKIN, M.P., Bryngwyn, Tram Inn, R. S. O.: **FIRST PRIZE**, 25*l.*, for "Mars;" was calved January 16th; bred by himself; sire, "Bangham" (6793); dam, "Lady Mary," by "Sir Isaac" (5598); g. d., "Lady Like," by "Victor" (5110); gr. g. d., "Little Annie," by "Speculum" (5612); gr. g. g. d., "Anne," by "Sir Oliver 2nd" (1733).
- 560 JOHN HUNGERFORD ARKWRIGHT, Hampton Court, Leominster, Herefordshire: **SECOND PRIZE**, 15*l.*, for "Upper Crust;" was calved February 19th; bred by himself; sire, "Cornlift" (5270); dam, "Ivington Lass 5th," by "Concord" (4458); g. d., "Ivington Lass 2nd," by "Sir Richard" (3460); gr. g. d., "Ivington Lass," by "Dan O'Connell" (1952); gr. g. g. d., by "Mortimer" (1328).
- 565 HENRY WILLIAM TAYLOR, Showle Court, Ledbury, Herefordshire: **THIRD PRIZE**, 10*l.*, for "Lucifer;" was calved September 27th; bred by himself; sire, "Franklin" (6961); dam, "Venus 3rd," by "Adamant" (5710); g. d., "Venus 2nd," by "Tredegar" (5077); gr. g. d., "Venus," by "Triumph 2nd" (3553); gr. g. g. d., "Pigeon," by "Twin" (2284).
- 566 WILLIAM TUDGE, Leinthall, Ludlow: the *Reserve Number* and *Highly Commended* for "Brilliant;" was calved February 12th; bred by himself; sire, "Auctioneer" (5194); dam, "Ruby," by "Napoleon" (5476); g. d., "Red Rose," by "Cannon Ball" (4399); gr. g. d., "Rosebud," by "Red Lake" (4075); gr. g. g. d., "Roseblossom," by "Defence" (3062).

CLASS 54.—Hereford Cows, in-milk or in-calf, calved previously to or in the Year 1881.

- 570 THE EARL OF COVENTRY, Croome Court, Severn Stoke, Worcestershire: **FIRST PRIZE**, 20*l.*, for "Golden Treasure;" was calved May 25th, 1878; in-milk; calved January 5th, 1885; bred by himself; sire, "Marechal Niel" (4760); dam, "Giantess," by "Sir Roger" (4133); g. d., "Haidee," by "Battenhall" (2406); gr. g. d., "Diana," by "Carbonel" (1525); gr. g. g. d., "Y. Dainty," by "Doctor" (1083).
- 575 HENRY WILLIAM TAYLOR, Showle Court, Ledbury, Herefordshire: **SECOND PRIZE**, 10*l.*, for "Rosamond;" was calved August 23rd, 1877; calved January 2nd, 1885, and in-calf; bred by the late Mr. William Taylor, Showle Court; sire, "Taunton" (5035); dam, "Monkton Beauty 3rd," by "Mercury" (3967); g. d., "Young Beauty," by "Sir Francis" (3438); gr. g. d., "Beauty," by "Holmer" (2043); gr. g. g. d., "Hazel," by "Tomboy" (1097).
- 574 FREDERICK JAMES GOUGH, Bordesley Hall, Redditch, Worcestershire: **THIRD PRIZE**, 5*l.*, for "Mabelle;" was calved July 18th, 1881; calved September 20th, 1884, and in-calf; bred by the late Mr. T. J. Carwardine, of Stockton Bury, Leominster, Herefordshire; sire, "Lord Wilton" (4740); dam, "Charity 2nd," by "Longhorns" (4711); g. d., "Charity," by "Heart of Oak" (2035); gr. g. d., "Luna," by "Counsellor" (1939); gr. g. g. d., "Picture," by "Sir Thomas" (2228).
- 571 JAMES RANKIN, M.P., Bryngwyn, Tram Inn, R. S. O.: the *Reserve Number* and *Highly Commended* for "Flo;" was calved April 22nd, 1881, in-milk, calved March 4th, 1885; bred by the late Mr. T. J. Carwardine, of Stockton Bury, Leominster, Herefordshire; sire, "Lord Wilton" (4740); dam, "Florence," by "De Cote" (3060); g. d., "Dewdrop," by "Heart of Oak" (2035); gr. g. d., "Hilda," by "Counsellor" (1939).

CLASS 55.—*Hereford Cows or Heifers, in-milk or in-calf, calved in the Year 1882.*

- 576 ALLEN EDWARDS HUGHES, Wintercott, Leominster, Herefordshire: FIRST PRIZE, 20*l.*, for "Sunflower;" was calved April 23rd; in-calf; bred by himself; sire, "Commander" (4452); dam, "Spangle 4th," by "Royalist" (4921); g. d., "Sonnet," by "Leofminster 3rd" (3211); gr. g. d., "Silk," by "Comet" (2469); gr. g. g. d., "Silva," by "Adforton" (1839).
- 578 JAMES RANKIN, M.P., Bryngwyn: SECOND PRIZE, 10*l.*, for "Grace Wilton;" was calved June 1st, in-milk, calved January 15th, 1885; bred by Mr. George Pitt, Chadnor Court, Leominster, Herefordshire; sire, "Lord Wilton" (4740); dam, "Graceful," by "Chadnor 2nd" (5244); g. d., "Lavender," by "Sir Oliver 2nd" (1733); gr. g. d., "Dainty," by "Riff Raff" (1052); gr. g. g. d., "Belle," by "Whitenob" (1116).
- 579 FREDERICK JAMES GOUGH, Bordesley Hall, Redditch, Worcestershire: THIRD PRIZE, 5*l.*, for "Rosa;" was calved July 5th, in-calf; bred by the late Mr. T. J. Carwardine, Stockton Bury, Leominster, Herefordshire; sire, "Lord Wilton" (4740); dam, "Rosabelle," by "Rodney" (4907); g. d., "Rosebud," by "De Cote" (3060); gr. g. d., "Stately," by "Heart of Oak" (2035); gr. g. g. d., "Ada," by "Counsellor" (1939).
- 577 JAMES RANKIN, M.P., Bryngwyn: the *Reserve Number* and *Highly Commended* for "Rebecca;" was calved April 16th, in-milk, calved January 20th, 1885; bred by the late Mr. T. J. Carwardine, of Stockton Bury, Leominster, Herefordshire; sire, "Lord Wilton" (4740); dam, "Ruth," by "Rodney" (4907); g. d., "Bella," by "De Cote" (3060); gr. g. d., "Charity," by "Heart of Oak" (2035); gr. g. g. d., "Luna," by "Counsellor" (1939).

CLASS 56.—*Hereford Cows with Two Offspring.†*

- 584 WILLIAM TUDGE, Leinthall, Ludlow: FIRST PRIZE, 20*l.*, for "Rebe;" was calved April 25th, 1879; sire, "Napoleon" (5476); dam, "Rebecca," by "Cannon Ball" (4399); g. d., "Red Star," by "Red Lake" (4075). "Rowena," was calved January 15th, 1884; sire, "Auctioneer" (5194). "New Year's Gift," was calved January 1st, 1885; sire, "Auctioneer" (5194); all bred by himself: and (585) SECOND PRIZE, 10*l.*, for "Roseleaf;" was calved November 20th, 1874; bred by Mr. William Tudge, Adforton, Leintwardine, Herefordshire; sire, "Lord Hythe" (3937); dam, "Rosebud," by "Sir Thomas" (2228); g. d., "Rose," by "North Star" (2138). "Prince Rose" (7191), was calved October 20th, 1881; sire, "Westonbury" (6254). "Rose of Leinthall," was calved May 8th, 1884; sire, "Auctioneer" (5194); both bred by himself.
- 581 ROBERT WILLIAM HALL, Ashton, Leominster, Herefordshire: the *Reserve Number* and *Highly Commended* for "Lovely;" was calved March 31st, 1876; sire, "Preceptor" (4030); dam, "Vanity," by "Artist" (2934); g. d., "Dainty," by "Ashton" (1500); gr. g. d., "Nutt," by "Uncle Tom" (1107); gr. g. g. d., "Silver," by "Monkland" (552). "Sir Julian" and "Sir Julius" were calved September 16th, 1884; sire, "Godolphin" (7664); all bred by himself.

CLASS 57.—*Hereford Heifers calved in the Year 1883.*

- 593 HENRY WILLIAM TAYLOR, Showle Court, Ledbury, Herefordshire: FIRST PRIZE, 20*l.*, for "Vanity 7th;" was calved February 17th; bred by

† Given by the Hereford Hard-Book Society.

himself; sire, "Franklin" (6961); dam, "Vanity 4th," by "Adamant" (5710); g. d., "Vanity," by "Troublesome" (5086); gr. g. d., "Fanny," by "Triumph" (2836); gr. g. g. d., "Silk," by "Twin" (2284).

- 590 ARTHUR PHILIP TURNER, The Leen, Pembridge, Herefordshire: **SECOND PRIZE**, 10*l.*, for "Kathleen," was calved March 8th; bred by himself; sire, "The Grove 3rd" (5051); dam, "Helena," by "Corsair" (5271); g. d., "Elfrida," by "Prince Arthur" (3345); gr. g. d., "Ella," by "Bachelor" (2941); gr. g. g. d., "Rosamond," by "Demetrius" (2494).
- 586 THE EARL OF COVENTRY, Croome Court, Severn Stoke, Worcestershire: **THIRD PRIZE**, 5*l.*, for "Plum Jam," was calved January 26th; bred by himself; sire, "Fisherman" (5913); dam, "Plum of Pershore," by "Longsides 2nd," g. d., "Plum," by "King Solomon" (4683).
- 588 JOHN PRICE, Court House, Pembridge, Herefordshire: the *Reserve Number* and *Highly Commended* for "Dowager," was calved April 15th; bred by himself; sire, "Hotspur" (7028); dam, "Duchess 5th," by "Horace" (3877); g. d., "Duchess," by "Cholstrey" (1918); gr. g. d., "Duchess," by "Wanderer" (5132); gr. g. g. d., "Duchess," by "Wellington" (1112).

CLASS 58.—Hereford Heifers calved in the Year 1884.

- 596 ALLEN EDWARDS HUGHES, Wintercott, Leominster, Herefordshire: **FIRST PRIZE**, 20*l.*, for "Ladybird," was calved January 21st; bred by himself; sire, "Garfield 2nd" (7648); dam, "Linnnet," by "Commander" (4452); g. d., "Laura," by "Winter De Cote"; gr. g. d., "Lovely 2nd," by "Tomboy" (3546); gr. g. g. d., "Lady Grove," by "Adforton" (1839).
- 597 THE EARL OF COVENTRY, Croome Court, Severn Stoke, Worcestershire: **SECOND PRIZE**, 10*l.*, for "Symmetry," was calved January 19th; bred by himself; sire, "Good Boy" (7668); dam, "Susannah," by "Prince Imperial" (5518); g. d., "Suck," by "Challenge 2nd" (3731); gr. g. d., "Susannah," by "Baron of Noke" (1863); gr. g. g. d., "Susannah," by "Sportsman" (1395).
- 612 HENRY WILLIAM TAYLOR, Showle Court, Ledbury: **THIRD PRIZE**, 5*l.*, for "Wintercott 10th," was calved June 3rd; bred by himself; sire, "Franklin" (6961); dam, "Wintercott 5th," by "Triumph 2nd" (3553); g. d., "Wintercott 4th," by "Sir Frank" (2762); gr. g. d., "Wintercott 3rd," by "France" (1993); gr. g. g. d., "Wintercott 2nd," by "Coroner" (1555).
- 599 JOHN PRICE, Court House, Pembridge, Herefordshire: the *Reserve Number* and *Highly Commended* for "Venus," was calved March 5th; bred by himself; sire, "Hotspur" (2078); dam, "Violet," by "Zero," alias "Theodore 2nd" (5707); g. d., "Violet," by "Paragon" (2665); gr. g. d., "Violet," by "Wanderer" (5132); gr. g. g. d., "Violet," by "Treasurer" (1105).

CLASS 59.—Devon Bulls calved in either 1880, 1881, 1882, or 1883.

- 617 WILLIAM PERRY, of Alder, Lewdown, Devonshire: **FIRST PRIZE**, 20*l.*, for "Benedict" (1504); was calved September 30th, 1880; sire, "Druid" (1317); dam, "Bracelet" (3229), by "Duke of Devon" (1056); g. d., "Bracelet" (2253), by "Duke of Flitton 2nd" (825); and (618) **SECOND PRIZE**, 10*l.*, for "Bravo" (1686); was calved August 30th, 1881; sire, "Druid" (1317); dam, "Bracelet" (3229), by "Duke of Devon" (1056); g. d., "Bracelet" (2533), by "Duke of Flitton 2nd"

(825); gr. g. d., "Cherry" (1852), by "Napoleon" (259); gr. g. g. d., "Colley" (1222), by "Duke of Wellington" (187); both bred by himself.

- 615 **SIR WILLIAM WILLIAMS**, Bart., Heanton, Barnstaple, Devonshire: the *Reserve Number* and *Highly Commended* for "Duke of Flitton 17th;" was calved in September, 1880; bred by Mrs. Langdon, Flitton Barton, North Molton, Devonshire; sire, "Sir Bevis"; dam, "Actress 13th," by "Young Palmerston;" g. d., "Actress 2nd," by "Duke of Flitton 3rd;" gr. g. d., "Actress," by "Palmerston;" gr. g. g. d., "Gold Medal Temptress," by "Davy's Napoleon 3rd."

CLASS 60.—Devon Bulls calved in the Year 1884.

- 625 **ALFRED C. SKINNER**, Pound Farm, Bishop's Lydeard, Taunton, Somerset: **FIRST PRIZE**, 20*l.*, for "General Gordon;" was calved February 12th; sire, "Lord Currypool" (1589); dam, "Moss Rose 3rd" (5532), by "Duke of Farrington" (1323); g. d., "Bouche's Moss Rose" (4124); and (626) **SECOND PRIZE**, 10*l.*, for "Lord Cutsey 4th;" was calved September 7th; sire, "Lord Currypool" (1589); dam, "Lady Cutsey" (5432), by "Lord Blagdon" (1377); both bred by himself.
- 622 **SIR WILLIAM WILLIAMS**, Bart., Heanton, Barnstaple, Devonshire: the *Reserve Number* for "Foreman;" was calved January 2nd; bred by himself; sire, "Duke of Flitton 17th;" dam, "Temptress 8th," by "Duke of Flitton 10th;" g. d., "Temptress 5th," by "Duke of Flitton 5th;" gr. g. d., "Temptress 2nd," by "Duke of Cornwall;" gr. g. g. d., "Gold Medal Temptress," by "Davy's Napoleon 3rd."

CLASS 61.—Devon Cows or Heifers, in-milk or in-calf, calved in the Year 1882.

- 627 **SIR WILLIAM WILLIAMS**, Bart., Heanton, Barnstaple: **FIRST PRIZE**, 15*l.*, for "Frolicsome;" was calved January 6th, in-calf; bred by himself; sire, "Jonquil 2nd;" dam, "Temptress 10th," by "Jonquil;" g. d., "Temptress 4th," by "Duke of Flitton 4th;" gr. g. d., "Gold Medal Temptress," by "Davy's Napoleon 3rd;" gr. g. g. d., "Pink," by "Nelson."
- 628 **JOHN HOWSE**, Leighland, Washford, Taunton, Somerset: **SECOND PRIZE**, 10*l.*, for "Lily 6th;" was calved January 23rd, in-calf; bred by himself; sire, "King of the Gipsies" (1580); dam, "Lily 5th" (5478); g. d., "Lily 3rd" (4683), by "Robin Hood" (914); gr. g. d., "Lily 2nd" (4682).
- 629 **ALFRED C. SKINNER**, Pound Farm, Bishop's Lydeard, Taunton: the *Reserve Number* and *Highly Commended* for "Myrtle 11th" (7018); was calved July 21st; in-calf; bred by himself; sire, "Myrtle's Duke" (1616); dam, "Myrtle 9th" (5546), by "Duke of Farrington" (1323); g. d., "Myrtle 3rd" (4767), by "Red Prince" (1432); gr. g. d., "Myrtle 2nd" (4766); gr. g. g. d., "Myrtle 1st" (4765), by "Squire Winter" (1453).

CLASS 62.—Devon Heifers calved in the Year 1883.

- 631 **SIR WILLIAM WILLIAMS**, Bart., Heanton, Barnstaple: **FIRST PRIZE**, 15*l.*, for "Flame;" was calved April 17th; bred by himself; sire, "Duke of Flitton 17th;" dam, "Famous 4th," by "Lord Stowey;" g. d., "Famous 2nd," by "Master Willie;" gr. g. d., "Famous," by a son of "Quantock;" gr. g. g. d., "Famous," by "Duke of Chester."

- 634 JOHN SUBBRIDGE, Colford Farm, Elworthy, Taunton, Somerset: **SECOND PRIZE**, 10*l.*, for "Norah 7th" (7171); was calved April 18th; bred by himself; sire, "Lord Currypoo" (1589); dam, "Norah 2nd" (7167), by "Admiral" (1267); g. d., "Norah" (2894 A); gr. g. d., "Young Nerissa" (3129); gr. g. g. d., "Nelly" (2893 B).
- 633 JOHN WALTER, M.P., Bearwood, Wokingham, Berks: the *Reserve Number* and *Highly Commended* for "Prettyface" (7309); was calved August 20th; bred by the late Mr. Walter Farthing, Stowey Court, Bridgwater, Somerset; sire, "Gentleman" (1566); dam, "Fair Maid" (3434), by "Master Robin" (1162); g. d., "Prettyface" (3804), by "Sir George" (925); gr. g. d., "Pink" (2929), by "Viscount" (746); gr. g. g. d., "Pink" (2928), by "Sir Peregrine" (722).

CLASS 63.—Devon Heifers calved in the Year 1884.

- 637 JOHN WALTER, M.P., Bearwood, Wokingham: **FIRST PRIZE**, 15*l.*, for "Dairymaid 4th;" was calved May 11th; bred by himself; sire, "Prettyface's Duke" (1627); dam, "Dairymaid 2nd" (4321), by "Master Willie" (1163); g. d., "Young Dairymaid" (4018) by "Master Alic" (881); gr. g. d., "Dairymaid" (2614), by "Viscount" (746); gr. g. g. d., "Dairymaid" (1259), by "Earl of Exeter" (38).
- 640 ALFRED C. SKINNER, Pound Farm, Bishop's Lydeard, Taunton, Somerset: **SECOND PRIZE**, 10*l.*, for "Myrtle 18th;" was calved August 18th; bred by himself; sire, "Lord Currypoo" (1589); dam, "Myrtle 6th" (5543), by "Duke of Farrington" (1323); g. d., "Myrtle 3rd" (4767), by "Red Prince" (1432).
- 639 WILLIAM PERRY, Alder, Lewdown, Devonshire: the *Reserve Number* and *Highly Commended* for "Rosette;" was calved May 22nd; bred by himself; sire, "Benedict" (1504); dam, "Rachel" (5620), by "Napoleon;" g. d., "Rachel 5th" (3868), by "Flitton" (1106); gr. g. d., "Rachel" (3866), by "Vincent" (1217).

CLASS 64.—Sussex Bulls calved in either 1880, 1881, 1882, or 1883.

- 643 J. STEWART HODGSON, Lythe Hill, Haslemere, Surrey: **FIRST PRIZE**, 15*l.*, for "Prince Rufus" (515); was calved July 31st, 1882; bred by himself; sire, "Young Oxford" (445); dam, "Laura 3rd" (2055), by "Little Tom;" g. d., "Laura 1st" (2053), by "Mottingham 1st" (190); gr. g. d., "Young Gentle."
- 642 WILLIAM STEWART FORSTER, Gore Court, Maidstone, Kent: **SECOND PRIZE**, 10*l.*, for "Standen 3rd" (523); was calved January 2nd, 1882; bred by Messrs. E. and A. Stanford, Eatons, Ashurst, Steyning, Sussex; sire, "Goldsmith" (391); dam, "Strawberry" (1565).
- 641 JOSEPH GODMAN, Park Hatch, Godalming, Surrey: the *Reserve Number* and *Highly Commended* for "Goldboy" (541); was calved July 15th, 1882; bred by Messrs. E. and A. Stanford, Eatons, Ashurst, Steyning, Sussex; sire, "Goldsmith" (391); dam, "Hardy 4th" (2238), by "Redheart" (360); g. d., "Hardy 1st" (2040), by "Dorchester" (325); gr. g. d., "Hardy" (2039), by "Young Westminster" (159).

CLASS 65.—Sussex Bulls calved in the Year 1884.

- 648 WILLIAM STEWART FORSTER, Gore Court, Maidstone: **FIRST PRIZE**, 15*l.*, was calved June 7th; sire, "Standen 3rd" (523); dam, "Splendour" (2145), by "Robinson Crusoe" (267); and (647) **SECOND PRIZE**, 10*l.*; was calved January 2nd; sire, "Ruby" (518); dam, "Countess" (2567), by "Dorchester" (325); both bred by himself.

- 650 JOSEPH GODMAN, Park Hatch, Godalming: the *Reserve Number* for "Noble Lord" (624); was calved April 13th; bred by himself; sire, "Napoleon 3rd" (396); dam, "Noble" (2270), by "The Bainten Bull;" g. d., "Noble," by "Sultan;" gr. g. d., by "Berry."

CLASS 66.—Sussex Cows or Heifers, in-milk or in-calf, calved in the Year 1882.

- 652 J. STEWART HODGSON, Lythe Hill, Haslemere: *FIRST PRIZE*, 15*l.*, for "Lady Bird 1st" (2875); was calved March 1st; in-milk; calved February 14th, 1885; bred by himself; sire, "Oxford" (304); dam, "Pitcher 3rd" (2105), by "Berry" (259); g. d., "Pitcher 2nd" (1545), by "Grand Duke" (185); gr. g. d., "Pitcher" (1434).

CLASS 67.—Sussex Heifers calved in the Year 1883.

- 654 JOSEPH GODMAN, Park Hatch, Godalming: *FIRST PRIZE*, 15*l.*, for "Noble Lady 1st" (3077); was calved April 25th; bred by himself; sire, "Napoleon 3rd" (396); dam, "Noble" (2270), by "The Bainten Bull;" g. d., "Noble," by "Sultan;" gr. g. d., by "Berry."
- 653 WILLIAM STEWART FORSTER, Gore Court, Maidstone: *SECOND PRIZE*, 10*l.*; was calved January 1st; bred by Messrs. E. and A. Stanford, Eatons, Ashurst, Steyning, Sussex; sire, "Hoasman" (392); dam, "Pretty Maid 2nd" (2681), by "Dorchester" (325).

CLASS 68.—Sussex Heifers calved in the Year 1884.

- 659 J. STEWART HODGSON, Lythe Hill, Haslemere: *FIRST PRIZE*, 15*l.*, for "Laura 7th" (3268); was calved January 6th; bred by himself; sire, "Lord Oxford" (461); dam, "Laura 3rd" (2055), by "Little Tom;" g. d., "Laura 1st" (2053), by "Mottingham 1st" (190); gr. g. d., "Young Gentle."
- 658 WILLIAM STEWART FORSTER, Gore Court: *SECOND PRIZE*, 10*l.*; was calved June 4th; bred by himself; sire, "Standen 3rd" (523); dam, "Bluebell" (1922), by "Kingsley" (337).
- 660 JOSEPH GODMAN, Park Hatch, Godalming: the *Reserve Number* and *Highly Commended* for "Bonette 3rd" (3167); was calved April 12th; bred by himself; sire, "Napoleon 3rd" (396); dam, "Bonette 1st" (2780), by "Woodman" (270); g. d., "Bonette" (1295), by "Leonard" (146); gr. g. d., "Bonny" (1034), by "Waxy."

CLASS 69.—Welsh Bulls calved in either 1880, 1881, 1882, or 1883.

- 667 EARL CAWDOR, Stackpole Court, Pembroke: *FIRST PRIZE*, 15*l.*, for "Zulu;" was calved July 26th, 1882; bred by Lord Harlech, of Tany-Bwlch, Harlech, N. Wales; sire, "Black Prince" (4); dam, "Beauty" (65).
- 664 LIEUT.-COL. H. PLATT, Gorddinog, Bangor, Carnarvonshire: *SECOND PRIZE*, 10*l.*, for "Black Prince 2nd;" was calved September 4th, 1880; bred by Mr. J. H. Platt, Bodior, Holyhead, Anglesey; sire, "Black Prince" (5a); dam, "Black Queen 2nd" (65), by "Prince Llewelyn;" g. d., "Black Queen 1st" (7); gr. g. d., "Jenny."
- 666 WILLIAM HERBERT JONES, West Orielton, Pembroke: the *Reserve Number* and *Highly Commended* for "Iron Duke;" was calved September 28th, 1882; bred by Earl Cawdor, Stackpole Court, Pembroke; sire, "Nameless" (109); dam, "Lady" (141), by "Tichborne" (23).

CLASS 70.—Welsh Bulls calved in the Year 1884.

- 669 LIEUT.-COL. H. PLATT, Gorddinog, Bangor: **FIRST PRIZE, 15*l.***, for "Black Dean;" was calved January 15th; bred by himself; sire, "Black Prince 2nd;" dam, "Blackan Bach" (140).
- 671 LORD HARLECH, Glynn, Tarsarnau, R. S. O., Merionethshire: **SECOND PRIZE, 10*l.***, for "Einion;" was calved February 4th; bred by himself; sire, "Black Prince" (4); dam, "Morfa" (42).
- 672 ALEXANDER MILNE DUNLOP, Hafod-y-bryn Farm, Llanbedr, Merionethshire: the *Reserve Number* for "Arthur;" was calved August 17th; bred by Mr. Samuel Pope, Q.C., Hafod-y-bryn, Llanbedr; sire, "Prince of Wales 4th" (39); dam, "Hilda" (166).

CLASS 71.—Welsh Cows or Heifers, in-milk or in-calf, calved in the Year 1882.

- 678 EARL CAWDOR, Stackpole Court, Pembroke: **FIRST PRIZE, 15*l.***, for "Curlen 4th;" was calved November 18th; in-calf; bred by himself; sire, "Duke of Connaught" (94); dam, "Curlen" (14).
- 675 LIEUT.-COL. H. PLATT, Gorddinog, Bangor: **SECOND PRIZE, 10*l.***, for "Blackan Bach 2nd;" was calved February 15th; in-calf; sire, "Grand Duke" (22); dam, "Blackan Bach"; and (674) the *Reserve Number* and *Highly Commended* for "Welsh Duchess 3rd;" was calved February 9th; in-calf; sire, "Grand Duke" (22); dam, "Welsh Duchess 2nd" (82), by "Prince Llewelyn 1st" (35); g. d., "Black Duchess" (4); both bred by Mr. J. H. Platt, Bodior, Holyhead, Anglesey.

CLASS 72.—Welsh Heifers, calved in the Year 1883.

- 683 JOHN DAVIES, Alleston, Pembroke: **FIRST PRIZE, 15*l.***, for "Nora;" was calved February 8th; bred by himself; sire, "Pembroke" (291); dam, "Curley" (155); by "Shah" (20).
- 682 LORD HARLECH, Glynn, Talsarnau, R. S. O.: **SECOND PRIZE, 10*l.***; was calved February 8th; sire, "Cipher" (11); dam, "Vesta" (51); and the (681) *Reserve Number* and *Highly Commended*; was calved January 13th; sire, "Black Prince" (4); dam, "Morfa" (42); both bred by himself.

CLASS 73.—Welsh Heifers, calved in the Year 1884.

- 687 WILLIAM EDWARD OAKELEY, The Plas, Tan-y-Bwlch, Merionethshire: **FIRST PRIZE, 15*l.***, for "Hatty;" was calved January 2nd; bred by himself; dam, "Netty."
- 691 JOHN DAVIES, Alleston, Pembroke: **SECOND PRIZE, 10*l.***, for "Alice;" was calved February 4th; bred by himself; sire, "Pembroke" (291); dam, "Queen" (289), by "Perfection" (125); g. d., "Princess" (156), by "Shah" (20).
- 684 LIEUT.-COL. H. PLATT, Gorddinog, Bangor, Carnarvonshire: the *Reserve Number* and *Highly Commended*; was calved February 15th; bred by himself; sire, "Black Prince 2nd" (6).

CLASS 74.—Red Polled Bulls, calved in either 1880, 1881, 1882, or 1883.

- 694 ALFRED TAYLOR, Starston Place, Harleston, Norfolk: **FIRST PRIZE, 15*l.***, for "Passion" (714); was calved January 2nd, 1881; bred by himself; sire, "King Charles" (329); dam, "Sly" (1192), by "Sir Edward 1st"

- (197); g. d., "Strawberry" (575), by "Richard 2nd" (173); gr. g. d., "Tiny" (604), by "Laxfield Sire" (101).
- 699 JEREMIAH JAMES COLMAN, M.P., Carrow House, Norwich: SECOND PRIZE, 10*l.*, for "Don Carlos;" was calved November 18th, 1882; bred by himself; sire, "King Charles" (329); dam, "Miss Atkins," by "Powell" (143); g. d., "Lady Atkins," by "Norfolk Duke" (127); gr. g. d., "Primrose," by "Tenant Farmer" (213).
- 697 LORD HASTINGS, Melton Constable, East Dereham, Norfolk: the *Reserve Number* and *Highly Commended* for "Roscoe;" was calved December, 1880; bred by Mr. T. Fulcher, Elmham, East Dereham; sire, "Redhead 2nd" (553); dam, "Rosy Cross" (1822), by "Brutus" (269); g. d., "Roseate" (1150), by "Barker" (253); gr. g. d., "Roseleaf" (499), by "Powell" (143); gr. g. d., "Rose" (E. 5), by "Cringelford Sire" (44).

CLASS 75.—Red Polled Bulls calved in the Year 1884.

- 704 LORD HASTINGS, Melton Constable: FIRST PRIZE, 15*l.*, for "The Duke;" was calved April 12th; bred by himself; sire, "Roscoe" (559); dam, "Davy Duchess 3rd" (2145), by "Davyson 7th" (476); g. d., "Davy 16th" (845), by "Redjacket 7th" (169); gr. g. d., "Davy 7th" (169), by "Young Duke" (234); gr. g. d., "Davy 2nd" (H. 1), by "Sir Nicholas" (202).
- 706 THE DUKE OF HAMILTON AND BRANDON, K.T., Easton Park, Wickham Market, Suffolk: SECOND PRIZE, 10*l.*, for "Orlando;" was calved July 13th; bred by himself; sire, "Perfect" (536); dam, "Jessie" (961), by "Theodore" (417); g. d., "Jenny" (279), by "The Peer" [(139)]; gr. g. d., "Ruby 4th" (518), by "Tenant Farmer" (213); gr. g. d., "Ruby 2nd," by "Hero 2nd" (86).
- 703 ROBERT EMLYN LOFFT, Troston Hall, Bury St. Edmunds, Suffolk: the *Reserve Number* for "Herat," was calved August 2nd, bred by himself; sire, "Stout" (581); dam, "Rosebud 1st."

CLASS 76.—Red Polled Cows or Heifers, in-milk or in-calf, calved in the Year 1882.

- 710 JEREMIAH JAMES COLMAN, M.P., Carrow House, Norwich: FIRST PRIZE, 15*l.*, for "Rosalie;" was calved August 25th; in-calf; bred by himself; sire, "King Charles" (329); dam, "Rosebud," by "Rufus" (188); g. d., "Rosebud," by "Norfolk Duke" (127); gr. g. d., "Cherry 2nd," by "Tenant Farmer" (213); gr. g. d., "Cherry."
- 709 THE DUKE OF HAMILTON AND BRANDON, K.T., Easton Park: SECOND PRIZE, 10*l.*, for "Kate;" was calved July 30th; in-calf; bred by himself; sire, "The Wilby Lad" (599); dam, "Kattie" (975), by "Benedict" (17); g. d., "Ringlet 2nd" (465), by "Tenant Farmer" (213); gr. g. d., "Ringlet," by "Hero of Newcastle" (85); gr. g. d., "Brettenham Strawberry," by "Redjacket" (163).
- 707 WILLIAM AMHURST TYSSEN-AMHERST, M.P., Didlington Hall, Brandon, Norfolk: the *Reserve Number* and *Highly Commended* for "Didlington Davy" (H.I. 2148); was calved January 27th; in-milk; calved December 1st, 1884, and in-calf; bred by himself; sire, "Davyson 7th" (476); dam, "Davy 24th" (H.I. 1448), by "Davyson 5th" (287); g. d., "Davy 15th" (844), by "Davyson 3rd" (48); gr. g. d., "Davy 5th" (167), by "Tenant Farmer;" gr. g. d., "Davy."

CLASS 77.—Red Polled Heifers, calved in the Year 1883.

- 711 WILLIAM AMHURST TYSEN-AMHERST, M.P., Diddington Hall: **FIRST PRIZE**, 15*l.*, for "Poppinette" (V. 43. 2455); was calved January 3rd; bred by himself; sire, "Davyson 3rd" (48); dam, "Poppy" (V. 43. 2456), by "Stout" (581); g. d., "Poppet 2nd" (1087), by "Cherry Duke" (32); gr. g. d., "Poppet" (1086), by "Sampson" (191).
- 715 LORD HASTINGS, Melton Constable, East Dereham: **SECOND PRIZE**, 10*l.*, for "Ruperta"; was calved October 20th; bred by himself; sire, "Roscoe" (559); dam, "Davy 19th" (848), by "Davyson 3rd" (48); g. d., "Davy 12th" (174), by "The Baron" (9); gr. g. d., "Davy 5th" (167), by "Tenant Farmer" (213); gr. g. g. d., "Davy" (H. 1).
- 713 ALFRED TAYLOR, Starston Place: the *Reserve Number* and *Highly Commended* for "Jovial"; was calved May 26th; in-calf; bred by himself; sire, "Passion" (714); dam, "Jewel" (281), by "Rufus 3rd" (186); g. d., "Mary Grey" (O. 8).

CLASS 78.—Red Polled Heifers, calved in the Year 1884.

- 720 JEREMIAH JAMES COLMAN, M.P., Cartow House, Norwich: **FIRST PRIZE**, 15*l.*, for "Midsummer Rose"; was calved June 26th; bred by himself; sire, "Othello" (713); dam, "Rosebud," by "Rufus (188); g. d., "Rosebud," by "Norfolk Duke" (127); gr. g. d., "Cherry 2nd," by "Norfolk Duke" (127); gr. g. g. d., "Cherry."
- 721 LORD HASTINGS, Melton Constable, East Dereham: **SECOND PRIZE**, 10*l.*, for "Melton Rose 5th"; was calved April 20th; bred by himself; sire, "Roscoe" (559); dam, "Melton Rose 2nd" (2865), by "Thornham Duke 2nd" (585); g. d., "Rosebud" (1804), by "Norfolk John" (131); gr. g. d., "Rose" (481), by "Redjacket 7th" (169); gr. g. g. d., "Polly" (416).
- 725 CHARLES AUSTIN, Brandeston Hall, Wickham Market, Suffolk: the *Reserve Number* and *Highly Commended* for "Constant"; was calved June 18th; bred by himself; sire, "Jumbo" (684); dam, "Countess" (2107), by "Stout" (581); g. d., "Constance 2nd" (800), by "Cherry Duke" (32).

CLASS 79.—Jersey Bulls, calved in either 1880, 1881, 1882, or 1883.

- 733 HENRY JAMES CORNISH, Thornford, Sherborne, Dorset: **FIRST PRIZE**, 15*l.*, for "Earl of St. Martins," dark brown; was calved May 20th, 1882; bred by Mr. Renouf, St. Martin's, Jersey; sire, "Forget-me-not" (291 J.H.B.); dam, "Jessy" (3342 J.H.B.).
- 737 WILLIAM P. ARKWRIGHT, Sutton Scarsdale, Chesterfield, Derbyshire: **SECOND PRIZE**, 10*l.*, for "King of Ashantee" (321), whole colour; was calved March 7th, 1881; bred by Mr. F. Le Brocq, St. Peter's, Jersey; sire, "Cetewayo" (224 J.H.B.); dam, "Pride of Kassasin" (2452 J.H.B.).
- 735 THE DUKE OF PORTLAND, Welbeck Abbey, Worksop, Nottinghamshire: the *Reserve Number* and *Highly Commended* for "The Young Duke," dark brown; was calved January 15th, 1882; bred by himself; sire, "Grand Duke" (40); dam, "Jessie."

CLASS 80.—Jersey Bulls calved in the Year 1884.

- 746 GEORGE SIMPSON, Wray Park, Reigate, Surrey: **FIRST PRIZE**, 15*l.*, for "Wolseley's Glory," grey; was calved February 10th; bred by Mr.

Francis Le Brocq, Les Augereux, St. Peter's, Jersey; sire, "Wolseley" (401 J.H.B.); dam, "Little Nelly" (630 J.H.B.), by "Happy" (309 J.H.B.); g. d., "Nelly" (1870 J.H.B.).

754 HENRY JAMES CORNISH, Thornford, Sherborne, Dorset: **SECOND PRIZE**, 10*l.*, for "Wolseley's Glory," grey; was calved March 26th; bred by Mr. Philip Le Feuvre, St. Owen's, Jersey; sire, "Wolseley" (P 401 J.H.B.); dam, "Miss Soulongue" (2970 J.H.B.).

747 GEORGE SIMPSON, Wray Park: the *Reserve Number* and *Highly Commended* for "Fun," grey; was calved January 11th; bred by himself; sire, "Farmer's Joy" (1075 E.H.B.); dam, "Frolic," by "Milkboy" (561 E.H.B.); g. d., "Fille d'Esprit," by "Eastern Chief" (1071 E.H.B.); gr. g. d., "Miss Vernon" (113 J.H.B.), by "Trust" (891 E.H.B.); gr. g. g. d., "Camelia" (273 J.H.B.).

CLASS 81.—Jersey Cows, in-milk or in-calf, calved previous to or in the Year 1881.

771 JOHN ARTHUR DESREAU, Perry Farm, St. Mary's, Jersey: **FIRST PRIZE**, 15*l.*, for "Rosy," light red; was calved February 17th, 1879; in-calf; bred by Mrs. De la Cour, St. Mary's, Jersey; sire, "Carlo" (180 J.H.B.); dam, "Belle" (1606), by "Orange Peel 2nd" (36 H.C.); g. d., "Marie Spelterini," by "Cadina" (54 H.C.).

765 GEORGE SIMPSON, Wray Park, Reigate: **SECOND PRIZE**, 10*l.*, for "Bessie," grey fawn; was calved May 12th, 1879; in-milk; calved May 3rd; bred by Mr. P. Mourant, St. Saviour's, Jersey; sire, "Noble 2nd" (1172 E.H.B.); dam, "Beauty" (637 J.H.B.).

766 MRS. MCINTOSH, Havering Park, Romford, Essex: the *Reserve Number* and *Highly Commended* for "Verbena 2nd," fawn and white; was calved January 25th, 1881; in-milk; calved June 2nd, 1884; bred by Mr. David McIntosh, Havering Park, Romford; sire, "Farmer's Glory;" dam, "Verbena 1st."

CLASS 82.—Jersey Cows or Heifers, in-milk or in-calf, calved in the Year 1882.

786 GEORGE SIMPSON, Wray Park: **FIRST PRIZE**, 15*l.*, for "Pandora 5th," grey; was calved January 21st; in-milk; calved May 4th, 1885; bred by himself; sire, "Nimrod" (1171 E.H.B.); dam, "Pandora 3rd" (219 E.H.B.), by "Farmer's Glory" (519 E.H.B.); g. d., "Pandora 2nd" (219 E.H.B.), by "Milord" (566 E.H.B.); gr. g. d., "Pandora" (1645 J.H.B.).

793 JOHN ARTHUR DESREAU, Perry Farm, St. Mary's, Jersey: **SECOND PRIZE**, 10*l.*, for "Sweet Secret," fawn; was calved December 11th; in-calf; bred by Mr. George Collas, St. Saviour's, Jersey; sire, "Cicero" (266); dam, "Secret" (2375 J.H.B.).

790 GEORGE WILLIAM PALMER, Elmhurst, Reading: the *Reserve Number* and *Highly Commended* for "Brown of the Elms" (888 H.C., J.H.B.), silver grey; in-milk; calved March 21st, 1885; bred by Mr. P. Perrée, The Elms, St. Mary's, Jersey; sire, "King" (238 C., J.H.B.); dam, "Brown 4th" (289 J.H.B.), by "Tom" (77 J.H.B.); was calved January 15th; g. d., "Brown 3rd" (1533); gr. g. d., "Brown" (966).

CLASS 83.—*Jersey Heifers calved in the Year 1883.*

- 809 HENRY JAMES CORNISH, Thornford, Sherborne, Dorset: **FIRST PRIZE, 15*l.***, for "Leonora," silver grey; was calved June 20th; in-milk; calved April 26th; bred by Mr. J. P. Falle, St. Martin's, Jersey; sire, "Franklin" (376 J.H.B.); dam, "Duchess of Waverley" (5879 J.H.B.).
- 804 GEORGE SIMPSON, Wray Park, Reigate: **SECOND PRIZE, 10*l.***, for "Bernice," grey; was calved February 6th; in-milk; calved May 25th, 1885; bred by himself; sire, "Farmer's Joy" (1075 E.H.B.); dam, "Beatrice," by "Sir Thomas" (1246 E.H.B.); g. d., "Belle des Quesnais."
- 810 HENRY JAMES CORNISH, Thornford: the *Reserve Number* and *Highly Commended* for "Pomona 2nd," dark mulberry; was calved July 24th; in-calf; bred by Mr. John Collas, St. Mary's, Jersey; sire, "Tombette Boy" (340 J.H.B.); dam, "Pomona" (749 J.H.B.).

CLASS 84.—*Jersey Heifers calved in the Year 1884.*

- 850 THE REV. LEONARD CHARLES WOOD, Singleton Vicarage, Poulton Fylde, Lancashire: **FIRST PRIZE, 15*l.***, for "Lady Bountiful 2nd," dark grey; was calved March 17th; bred by himself; sire, "His Majesty" (J.H.B.); dam, "Lady Bountiful."
- 842 HENRY JAMES CORNISH, Thornford, Sherborne, Dorset: **SECOND PRIZE, 10*l.***, for "Pearl," fawn; was calved March 3rd; sire, "Cicero 2nd" (E.H.B.); dam, "Pretty Lass," by "Forester" (1080 E.H.B.); g. d., "Young Princess," by "Claimant" (177 J.H.B.); gr. g. d., "Mignonnette: and (843) the *Reserve Number* and *Highly Commended* for "Carlo's Adrienne 2nd," grey fawn; was calved April 30th; sire, "Jolly" (E.H.B.); dam, "Carlo's Adrienne," by "Baron 2nd;" g. d., "Adrienne" (2577 J.H.B.); both bred by himself.

CLASS 85.—*Polled Aberdeen or Angus Bulls, calved in either 1880, 1881, 1882, or 1883.*

- 857 OWEN C. WALLIS, Bradley Hall, Wylam-on-Tyne, R.S.O., co. Durham: **FIRST PRIZE, 15*l.***, for "Juggler," black; was calved April 24th, 1882; bred by himself; sire, "King of Diamonds" (1818); dam, "Jemima of Ballindalloch" (4172), by "Editor" (1460); g. d., "Judy" (2996), by "Ballimore" (741); gr. g. d., "Jilt" (973), by "Black Prince of Tillyfour" (366); gr. g. g. d., "Beauty of Tillyfour 2nd" (1180), by "Young Jock" (4).
- 859 GEORGE WILKEN, Waterside of Forbes, Alford, Aberdeenshire: **SECOND PRIZE, 10*l.***, for "The Black Knight" (1809), black; was calved January 5th, 1880; bred by Mr. D. A. Pearson, Johnston, Lawrence-kirk, Kincardineshire; sire, "A. K. H. B." (1576); dam, "Pride of Aberdeen 17th" (4078), by "M. P." (1250); g. d., "Pride of Aberdeen 3rd" (1168), by "Black Prince of Tillyfour" (366); gr. g. d., "Pride of Aberdeen" (581), by "Hanton" (228); gr. g. g. d., "Charlotte" (203), by "Angus" (45).
- 856 THE EARL OF STRATHMORE, Glamis Castle, Forfarshire: the *Reserve Number* for "Alister" (1939), black; was calved December 9th, 1881; bred by Mr. William Whyte, Spott, Kirriemuir, Forfarshire; sire, "Khan" (1262); dam, "Aggie of Spott" (4712), by "M. P." (1250); g. d., "Auntie" (4711), by "Moudiewart" (686); gr. g. d., "Ashentilly" (1029), by "Colonel of East Tulloch" (391).

CLASS 86.—*Polled Aberdeen or Angus Bulls calved in the Year 1884.*

- 862 CLEMENT STEPHENSON, Baliol College Farm, Long Benton, Newcastle-on-Tyne: **FIRST PRIZE**, 15*l.*, for "Evander" (3717), black; was calved January 19th; bred by Sir G. Macpherson Grant, Bart., M.P., Ballindalloch Castle, N.B.; sire, "Julius" (1819); dam, "Evening" (4187), by "Elcho" (595); g. d., "Eva" (984), by "Victor of Ballindalloch" (403); gr. g. d., "Eisa" (977), by "Trojan" (402); gr. g. g. d., "Erica" (843), by "Cupbearer" (59).
- 863 GEORGE WILKEN, Waterside of Forbes, Alford, Aberdeenshire: **SECOND PRIZE**, 10*l.*, for "Waterside Heir," black; was calved June 5th; bred by himself; sire, "Wedgwood" (2409); dam, "Pride of Aberdeen 9th" (3253), by "Sir Garnet" (684); g. d., "Pride of Aberdeen 7th" (1777), by "Derby" (377); gr. g. d., "Pride of Aberdeen" (581), by "Hanton" (228); gr. g. g. d., "Charlotte" (203), by "Angus" (45).

CLASS 87.—*Polled Aberdeen or Angus Cow or Heifer, in-milk or in-calf, calved in the Year 1882.*

- 866 GEORGE WILKEN, Waterside of Forbes: **FIRST PRIZE**, 15*l.*, for "Waterside Matilda 3rd" (6313), black; was calved April 11th; in-milk; calved May 6th, 1885; bred by himself; sire, "Hetherbred Lad" (2139); dam, "Waterside Matilda" (6311), by "Aggressor" (1241); g. d., "Matilda" (4318), by "Huntly" (937); gr. g. d., "Black Diamond" (1849), by "Windsor of Indigo" (915); gr. g. g. d., "Countess."
- 864 OWEN C. WALLIS, Bradley Hall, Wylam-on-Tyne, R. S. O.: **SECOND PRIZE**, 10*l.*, for "Pride Languish" (5681), black; was calved January 19th; in-milk; calved February 7th, 1885; bred by Mr. J. Hannay, Gavenwood, Banff, N.B.; sire, "Young Hero" (1837); dam, "Lilias of Tillyfour" (1795), by "Black Prince of Westerfowlis" (617); g. d., "Pride of Aberdeen 5th" (1174), by "Bright" (454); gr. g. d., "Prince of Aberdeen" (581), by "Hanton" (228); gr. g. g. d., "Charlotte" (203), by "Angus" (45).
- 865 ARTHUR EGGINTON, of South Ella, Hull: the *Reserve Number* for "Pendant 3rd" (6811), black; was calved November 7th; in-milk; calved January 15th, 1885; bred by himself; sire, "Cupid 2nd" (1925); dam, "Pendant 2nd" (5432), by "Kinsman" (1444); g. d., "Pendant" (1985), by "Palmerston" (374); gr. g. d., "Fanny of Corskie" (1014), by "Priam" (467); gr. g. g. d., "Fancy of Castle Fraser" (1279), by "Black Jock of Tillyfour" (365).

CLASS 88.—*Polled Aberdeen or Angus Heifers calved in the Year 1883.*

- 867 THE EARL OF STRATHMORE, of Glamis Castle, Glamis, Forfarshire: **FIRST PRIZE**, 15*l.*, for "Victoria 3rd of Kinnochtry" (8464), black; was calved July 28th; in-calf; bred by Mr. Thomas Ferguson, Kinnochtry, Coupar Angus, Perthshire; sire, "Knight of Johnston" (2192); dam, "Blooming Bride" (4343), by "Shah" (680); g. d., "Blossom of Kinnochtry" (3970), by "Young Viscount" (736); gr. g. d., "Heather Blossom" (1703), by "Elector" (427); gr. g. g. d., "Heather Bloom" (1189), by "Clansman" (398).
- 869 GEORGE WILKEN, Waterside of Forbes, Alford, Aberdeenshire: **SECOND PRIZE**, 10*l.*, for "Waterside Queen Mother" (8007), black; was calved January 24th; in-calf; bred by himself; sire, "Valhalla" (2383); dam,

"Jemima 3rd" (4962), by "Bogfern" (901); g. d., "Jemima 2nd" (4082), by "Champion of Findrack" (783); gr. g. d., "Jemima" (2078), by "Patrick" (782); gr. g. d., "Fancy of Morlich" (2076), by "Balwylo Eclipse" (781).

- 868 MAJOR HENRY F. DENT, Ainderby Hall, Northallerton, Yorkshire: the *Reserve Number* for "Veranda," black; was calved May 25th; in-calf; bred by Mr. James Mackie, Lewes of Fyrie, Fyrie, Aberdeenshire; sire, "Johnny Gibb" (2166); dam, "Eliza of Haddo 5th" (4747), by "Oak-tree" (1177); g. d., "Eliza of Haddo 3rd" (1112); gr. g. d., "Eliza of Haddo 2nd" (1221), by "Hollyhock" (179); gr. g. d., "Eliza of Haddo" (776), by "Fintray of Tillyfour" (85).

CLASS 89.—Polled Aberdeen or Angus Heifers calved in the Year 1884.

- 874 THE EARL OF STRATHMORE, Glamis Castle: **FIRST PRIZE, 15l.**, for "Satanella" (9351), black; was calved February 6th; bred by himself; sire, "Alistair" (1939); dam, "Sarah of Glamis" (6188), by "Rab" (1584); g. d., "Sarah 2nd" (4946), by "Emperor of East Tulloch" (396); gr. g. d., "Sarah of East Tulloch" (1722), by "Cavalier" (411).
- 872 CLEMENT STEPHENSON, Baliol College Farm, Long Benton, Newcastle-on-Tyne: **SECOND PRIZE, 10l.**, for "Lady Victorine" (8236), black; was calved January 29th; bred by the Hon. Charles Carnegie, Mount Melville Home Farm, St. Andrews; sire, "Royal Victor" (1780); dam, "Lady Day" (2433), by "Elector" (427); g. d., "Grace Darling 2nd" (1071), by "Priam" (467).
- 875 THE EARL OF STRATHMORE, Glamis Castle: the *Reserve Number* for "Veronica of Glamis" (9355), black; was calved January 27th; bred by himself; sire, "Alistair" (1939); dam, "Violet of Montbletton" (1399), by "Squire" (436); g. d., "Lady Ida" (102), by "Black Diamond" (464); gr. g. d., "Mayflower 2nd" (1020), by "The Earl" (291); gr. g. d., "Mayflower of Montbletton" (614), by "Craig" (260).

CLASS 90.—Galloway Bulls calved in either 1880, 1881, 1882, or 1883.

- 882 ALEXANDER McCOWAN, Newtonairs, Dumfries: **FIRST PRIZE, 15l.**, for "Mosstrooper of Drumlanrig" (1672), black; calved in March, 1881; bred by the late Duke of Buccleuch, K.G., Drumlanrig Castle, Thornhill, Drumfriesshire; sire, "Black Prince of Drumlanrig" (546); dam, "Serramis of Drumlanrig" (2670), by "Chieftain of Drumlanrig" (752).
- 886 ANDREW MONTGOMERY, Nether Hall, Castle Douglas, N.B.: **SECOND PRIZE, 10l.**, for "Statesman 2nd of Drumlanrig" (1786); was calved February 22nd, 1882; bred by the late Duke of Buccleuch, K.G., Drumlanrig Castle; sire, "Black Prince of Drumlanrig" (546); dam, "Beattie of Drumlanrig" (2183), by "Statesman" (630); g. d., "Countess of Blaikett" (1582), by "Clansman of Blaikett" (629).
- 885 JAMES CUNNINGHAM, Tarbreoch, Dalbeattie, N.B.: the *Reserve Number* and *Highly Commended* for "Wilmington 5th," black; was calved January 16th, 1880; bred by Mr. J. Graham, Parcelstown, Longtown, Cumberland; sire, "Harden" (1151); dam, "Dinah 2nd" (2671), by "Braw Willie" (1051).

CLASS 91.—Galloway Bulls calved in the Year 1884.

- 889 JAMES GRAHAM, Longburgh House, Burgh-by-Sands, Carlisle: **FIRST PRIZE, 15l.**, for "Deloraine 5th" (3322), black; was calved January

- 14th; bred by himself; sire, "Deloraine 2nd" (1336); dam, "Hannah 10th" (2973), by "Sim of Whitram" (562); g. d., "Hannah 5th" (1421), by "Willie of Westburnflat" (523); gr. g. d., "Hannah 3rd" (1319), by "Bob Burns" (235); gr. g. g. d., "Hannah" (214), by "Brother to Mosstrooper" (67).
- 888 ROBERT JEFFERSON, Rotheryke, Egremont, Cumberland: SECOND PRIZE, 10*l.*, for "Corsair" (3332), black; was calved January 10th; bred by Mr. Maxwell Clark, Culmain, Crocketford, Dumfriesshire; sire, "Competitor" (1784); dam, "Duchess 4th of Culmain" (3666), by "Queensberry" (1027); g. d., "Bell of Culmain" (1550), by "Wallace of Culmain" (821); gr. g. d., "Ewart" (2962) by "Mullock of Culmain" (1141).
- 890 JAMES CUNNINGHAM, Tarbreoch, Dalbeattie, N.B.: the *Reserve Number* and *Highly Commended* for "Ancient Johnny of Balgray," black; was calved March 15th; bred by Mr. J. Jardine Paterson, Balgray, Lockerbie, Dumfriesshire; sire, "Independence" (1695); dam, "Mary 4th of Tarbreoch" (3273), by "Chamberlain" (666); g. d., "Mary 2nd of Tarbreoch" (1671), by "Balig" (729).

CLASS 92.—*Galloway Cows or Heifers, in-milk or in-calf, calved in the Year 1882.*

- 893 ANDREW MONTGOMERY, of Nether Hall, Castle Douglas, N.B.: FIRST PRIZE, 15*l.*, for "Netty of Culmain" (4240), black; was calved February 27th; in-milk; calved in January, 1885; bred by Mr. Maxwell Clark, Culmain, Crocketford, Dumfriesshire; sire, "Competitor" (1784); dam, "Nancy of Culmain" (3003), by "Prince of Wales" (1041); g. d., "Blossom of Culmain" (2775), by "Mangerton" (525); and (894) SECOND PRIZE, 10*l.*, for "Grand Lady" (6629), black; was calved in March; in-calf; bred by Mr. Robert Webster, Airds, New Galloway, N.B.; sire, "Wolseley" (1509); dam, "Maggie of Airds" (4091), by "Hector of Park Robin" (4676); g. d., "Sonny of Park Robin" (4676), by "Grandson of Bob Burns" (235); and (892) the *Reserve Number* and *Highly Commended* for "Helena 5th of Wedholme" (5170), black; was calved March 10th; in-calf; bred by Mr. John Millican, Wedholme House, Abbey Town, Cumberland; sire, "The Mackintosh 2nd" (1341); dam, "Helena 2nd of Wedholme" (3185), by "Hazledean" (1010); g. d., "Helena of Wedholme" (3174), by "Moorcock of Wedholme" (1255).

CLASS 93.—*Galloway Heifers, calved in the Year 1883.*

- 897 ANDREW MONTGOMERY, Nether Hall: FIRST PRIZE, 15*l.*, for "Braw Lady" (8805), black; was calved March 23rd; bred by Mr. Robert Webster, Airds, New Galloway, N.B.; sire, "Osman" (1282); dam, "Maggie of Airds" (4091), by "Hector of Park Robin" (2137); g. d., "Sonny of Park Robin" (4676), by "Grandson of Bob Burns" (235); and (896) SECOND PRIZE, 10*l.*, for "Tidy Lass" (7997), black; was calved March 14th; bred by himself; sire, "Chelmsford" (1568); dam, "Tidy 8th" (4313), by "Duke of Edinburgh" (1417); g. d., "Tidy 4th" (3667), by "Duke of Drumlanrig" (667).
- 895 JAMES CUNNINGHAM, Tarbreoch, Dalbeattie, N.B.: the *Reserve Number* and *Highly Commended* for "Agnos 2nd of Sandbed," black; was calved March 7th; bred by Mr. Robert Beaty, Sandbed, Longtown, Cumberland; sire, "Good Templar" (1781); dam, "Agnes of Parcelstown" (2611), by "Sim of Whitram" (562); g. d., "Queen of Culloch" (1315),

by "Sir Walter" (536); gr. g. d., "Agnes of Meikle Culloch" (220), by "Wellington" (22); gr. g. d., "Mary of Meikle Culloch" (209), by "The Squire" (18).

CLASS 94.—*Galloway Heifers, calved in the Year 1884.*

- 901 **FREDERICK ERNEST VILLIERS**, Closeburn Hall, Thornhill, N.B.: **FIRST PRIZE, 15l.**, for "Villa," black; was calved January 25th; bred by himself; sire, "John Highland Man of Closeburn;" dam, "Soucie of Closeburn," by "Paul Pry."
- 905 **ANDREW MONTGOMERY**, Nether Hall: **SECOND PRIZE, 10l.**, for "Marchioness of Nithsdale," black; was calved January 23rd; sire, "Corporal" (1838); dam, "Mabel" (4410), by "Earl of Nithsdale" (1035); g. d., "Lady Kenmere" (4352), by "Max"; and (906) the *Reserve Number* and *Highly Commended* for "Lady Salisbury," black; was calved March 13th; sire, "Queensberry 4th" (1785); dam, "Black Lady of Murrayta" (6320), by "Lord Salisbury" (1362); g. d., "Blackie of Murrayta" (5724), by "Mullocks Buittle Laddie" (2364); both bred by himself.

CLASS 95.—*Ayrshire Bulls, calved in either 1880, 1881, 1882, or 1883.*

- 907 **WILLIAM BARTLEMORE**, of Netherhouses, Lochwinnoch, by Glasgow: **FIRST PRIZE, 15l.**, for "Hover a Blink" (892), light brown and white; was calved in 1881; bred by Mr. Hutcheson, McCoshton, Stair, Ayrshire; and (908) **SECOND PRIZE, 10l.**, for "Silver King" (684), white; was calved in April, 1883; bred by Mr. James Wallace, Piperhill, Ochiltree, Ayrshire; sire, "Hover a Blink" (892).

CLASS 96.—*Ayrshire Bulls, calved in the Year 1884.*

- 909 **WILLIAM BARTLEMORE**, Netherhouses: **FIRST PRIZE, 15l.**, for brown and white; was calved in April; bred by himself; sire, "Royal Star" (682).

CLASS 97.—*Ayrshire Cows or Heifers, in-milk or in-calf, calved in the Year 1882.*

- 912 **ROBERT WILSON**, Mansuraes, Kilbarchan, Renfrewshire: **FIRST PRIZE, 15l.**, for his brown and white; in-milk; calved July, 1884; bred by himself; sire, "Brownie"; dam, "Whitie."
- 911 **WILLIAM BARTLEMORE**, Netherhouses: **SECOND PRIZE, 10l.**, for "Silver Queen," brown and white; in-calf; due to calve before the Show; bred by Mr. Andrew Hoggan, Jun., Busby Farms, Busby, Lanarkshire; sire, "Prince" (47).

CLASS 98.—*Ayrshire Heifers, calved in the Year 1883.*

- 913 **MARK JOHN STEWART**, Southwick, Dumfries, N.B.: **FIRST PRIZE, 15l.**, for "Blakehouse," red and white; was calved in February, 1883; bred by Mr. James Mitchell, Blakehouse, Newton Mearns; sire, "Robin Hervey" (8646); dam, "Old Blakehouse"; and (915) **SECOND PRIZE, 10l.**, for "Maggie IV." (3272), white; was calved in April; bred by Mr. Robert Wilson, Mansuraes, Kilbarchan, N.B.; sire, "Baron of Buchligore" (281); dam, "Maggie 3rd" (287), by "Topsman 2nd."

CLASS 99.—*Ayrshire Heifers, calved in the Year 1884.*

- 916 **WILLIAM BARTLEMORE**, Netherhouses, Lochwinnoch by Glasgow: **FIRST PRIZE, 15l.**, for "Princess II." (2667), brown and white; was calved in April; bred by himself; dam, "Princess I." (2174).

CLASS 100.—*Dairy Cow, calved previously to or in the Year 1881, giving not less than 18 quarts of milk per diem, containing not less than 12 per cent. of solids (including butter-fat).*

- 919 JOSEPH PHILLIPS, Park Meadow Farm, Peterborough: **FIRST PRIZE, 25*l.***, for "Red Cherry" (Shorthorn), red; was calved November 24th, 1875; in-milk; calved April 23rd, 1885; bred by himself.
- 922 THOMAS ATKINSON, Higher House, Unsworth, Manchester: **SECOND PRIZE, 15*l.***, for his Crossbred; age and breeder unknown.
- 921 PHILIP ASCROFT, Hesket Arms, Rufford, Ormskirk, Lancashire: the *Reserve Number and Highly Commended* for red and white; age and breeder unknown.

CLASS 101.—*Cow, calved in 1882, giving not less than 12 quarts of milk per diem, containing not less than 12 per cent. solids (including Butter fat).* [No award.]

CLASS 102.—*Three Cows, in-milk, of any breed or cross, most suitable for dairy purposes.**

- 931 GEORGE COOKE, Clayley Hall, Handley, Cheshire: **FIRST PRIZE, 20*l.***, for his Shorthorns. "Mary," red and white, was calved March 19th, 1878; bred by the late Sir W. Miles, Bart., Leigh Court, Bristol; sire, "Wild Duke of Geneva" (36,004); dam, "Bessy," by "Meteor" (29,364). "Juliet 2nd," red, was calved February 26th, 1879; bred by himself; sire, "Oscar Gwynne," dam, "Juliet," by "Duke of York" (31,038). "Strawberry 5th," roan, was calved July 15th, 1882; bred by himself; sire, "Bruce;" dam, "Strawberry 4th," by "Viscount" (42,555).
- 933 JOSEPH HARRIS, Calthwaite Hall, Penrith, Cumberland: **SECOND PRIZE, 10*l.***, for his Shorthorns. "Sonsie 28th," roan, was calved March 21st, 1878; bred by Sir Wilfrid Lawson, Bart., M.P., Brayton, Carlisle; sire, "Wild Eyes Duke" (36,007); dam, "Sonsie 20th." "Dairymaid," roan, was calved in 1879; bred by Mr. Thomas Bowman, Brawmery, Ainstable, Penrith. "Jessie," roan, was calved in 1876; bred by Mr. Isaac Park, Robinson House, Penrith.
- 928 EDWARD HOLMES, Crow Trees Farm, Bartle, Preston: **THIRD PRIZE, 5*l.***, for his Crossbreds. "Peggotty 2nd," roan, was calved September 15th, 1879; bred by Mr. Robert Parkinson, Allen Bank, Elswick; sire, "The Marquis" (40,303). "Violet," roan, was calved March 31st, 1878; bred by Mr. C. R. Jackson, Barton Hall, Barton; sire, "Valentine." "Pink," roan, was calved in 1880; breeder unknown.
- 927 JOHN COTTAM, Well House, Scotforth, Lancaster: the *Reserve Number and Highly Commended* for his Shorthorns. Roan; was calved in 1878; breeder unknown: roan, was calved in 1880; breeder unknown: red and white; was calved in 1881; bred by himself.

CLASS 103.—*Dairy Heifers, in-milk, calved in the Year 1883.*

- 936 THOMAS ATKINSON, Higher House, Unsworth, Manchester: **FIRST PRIZE, 15*l.***, for his Crossbred; was calved January 20th; bred by himself.
- 934 THOMAS ALBERT CROOK, Chesham House, Inskip, Poulton-le-Fylde, Lancashire: **SECOND PRIZE, 10*l.***, for his Shorthorn, "Peggoty 4th," roan; was calved April 4th; in-milk; bred by Mr. R. Parkinson, Allen Bank, Elswick, Poulton-le-Fylde; dam, "Peggoty," by "Charles le Beau."

SHEEP.

CLASS 104.—*Leicester Two-Shear Rams.*

- 950 TEASDALE H. HUTCHINSON, Manor House, Catterick, Yorkshire: **FIRST PRIZE, 15*l.***, and (949) **SECOND PRIZE, 10*l.***; were dropped in March 1883; bred by himself.
- 952 JOHN AND DAVID LINTON, Low Street, Bedale, Yorkshire: **THIRD PRIZE, 5*l.***; was dropped in April 1883; bred by himself.
- 944 JEREMIAH BOOTH GREEN, Low House Farm, Silsden, Leeds: the *Reserve Number*; was dropped in March 1883; bred by Mr. E. F. Jordau, Eastburn, Driffield.

CLASS 105.—*Leicester Shearling Rams.*

- 972 TEASDALE H. HUTCHINSON, Manor House, Catterick: **FIRST PRIZE, 15*l.***, and (971) **SECOND PRIZE, 10*l.***; were dropped in March 1884; bred by himself.
- 957 ERNEST FRANCIS JORDAN, Eastburn, Driffield, Yorkshire: **THIRD PRIZE, 5*l.***, and (958) the *Reserve Number* and *Commended*; were dropped in April 1884; bred by himself.

CLASS 106.—*Leicester Ram Lambs—Pens of Three.*

- 977 JEREMIAH BOOTH GREEN, Low House Farm, Silsden, Leeds: **FIRST PRIZE, 10*l.***; were dropped in March; bred by himself.
- 980 TOM STRICKLAND, Thirsk Junction, Thirsk, Yorkshire: **SECOND PRIZE, 5*l.***; were dropped in March; bred by himself.
- 976 ROBERT HARRISON, Underpark, Lealholm, Grosmont, Yorkshire: the *Reserve Number*; were dropped in March; bred by himself.

CLASS 107.—*Leicester Shearling Ewes—Pens of Five.*

- 983 ERNEST FRANCIS JORDAN, Eastburn, Driffield: **FIRST PRIZE, 15*l.***, and (982) **SECOND PRIZE, 10*l.***; were dropped in April 1884; bred by himself.
- 984 JOHN AND DAVID LINTON, Low Street Brewery, Bedale, Yorkshire: the *Reserve Number* and *Highly Commended*; were dropped in April 1884; bred by themselves.

CLASS 108.—*Border Leicester Two-Shear Rams.*

- 989 THOMAS LAMBERT, Elrington Hall, Hexham, Northumberland: **FIRST PRIZE, 15*l.***; was dropped in March 1883; bred by himself.
- 988 WILLIAM HESLOP, High House, Marwood, Barnard Castle, Durham: **SECOND PRIZE, 10*l.***; was dropped in March 1883; bred by Mr. Annandale, Lintz Ford, Lintz Green, Durham.
- 987 W. J. AND T. BAIN, Legars, Kelso, Roxburghshire: the *Reserve Number*; was dropped in March 1883; bred by Mr. John Thompson, Ballie Knowe, Kelso.

CLASS 109.—*Border Leicester Shearling Rams.*

- 998 ROBERT WALLACE, of Auchenbrain, Mauchline, Ayrshire: **FIRST PRIZE, 15*l.***, and (997) **SECOND PRIZE, 10*l.***; were dropped in March 1884; bred by himself.

- 994 JOHN THOMPSON, of Ballieknowe, Kelso, N.B.: the *Reserve Number* and *Highly Commended*; was dropped in March, 1884; bred by himself.

CLASS 110.—Border Leicester Ram Lambs—Pens of Three.

- 1004 JOHN TWENTYMAN, Blennerhasset Farm, Aspatria, Cumberland: **FIRST PRIZE, 10*l.***, and (1005) **SECOND PRIZE, 5*l.***; were dropped in March; bred by himself.
- 1003 THOMAS LAMBERT, Elrington Hall, Hexham, Northumberland: the *Reserve Number*; were dropped in March; bred by himself.

CLASS 111.—Border Leicester Shearling Ewes—Pens of Five.

- 1008 JOHN TWENTYMAN, Blennerhasset Farm, Aspatria: **FIRST PRIZE, 15*l.***; were dropped in March, 1884; bred by himself.
- 1006 JOHN THOMPSON, Ballieknowe, Kelso, N.B.: **SECOND PRIZE, 10*l.***; were dropped in March, 1884; bred by himself.
- 1007 THOMAS LAMBERT, Elrington Hall, Hexham, Northumberland: the *Reserve Number*; were dropped in March, 1884; bred by himself.

CLASS 112.—Cotswold Two-Shear Rams.

- 1010 THOMAS and STEPHEN GEORGE GILLETT, Kilkenny Farm, Faringdon, Oxfordshire: **FIRST PRIZE, 15*l.***; was dropped in February, 1883; bred by themselves.
- 1012 ROBERT JACOBS, Signett Hill, Burford, Oxfordshire: **SECOND PRIZE, 10*l.***; was dropped in February, 1883; bred by himself.
- 1011 THOMAS and STEPHEN GEORGE GILLETT, the *Reserve Number* and *Commended*; was dropped in February, 1883; bred by themselves.

CLASS 113.—Cotswold Shearling Rams.

- 1020 ROBERT JACOBS, Signett Hill, Burford: **FIRST PRIZE, 15*l.***; was dropped in February, 1884; bred by himself.
- 1014 THOMAS and STEPHEN GEORGE GILLETT, Kilkenny Farm, Faringdon, Oxfordshire: **SECOND PRIZE, 10*l.***; was dropped in February, 1884; bred by themselves.
- 1019 ROBERT JACOBS: the *Reserve Number* and *Commended*; was dropped in February, 1884; bred by himself.

CLASS 114.—Cotswold Ram Lambs—Pens of Three.

- 1021 THOMAS and STEPHEN GEORGE GILLETT, Kilkenny Farm: **FIRST PRIZE, 10*l.***; were dropped in February; bred by themselves.
- 1025 HENRY AKERS, Black Bourton, Faringdon, Berks: **SECOND PRIZE, 5*l.***, and (1024) the *Reserve Number* and *Highly Commended*; were dropped in February; bred by himself.

CLASS 115.—Cotswold Shearling Ewes—Pens of Five.

- 1026 THOMAS and STEPHEN GEORGE GILLETT, Kilkenny Farm: **FIRST PRIZE, 15*l.***; were dropped in February, 1884; bred by themselves.

CLASS 116.—*Lincoln Two-Shear Rams.*

- 1031 ROBERT WRIGHT, Nocton Heath, Lincoln: **FIRST PRIZE, 15*l.***; was dropped in March, 1883; bred by himself: and (1030) **SECOND PRIZE, 10*l.***; was dropped in March, 1883; bred by Mr. William Grimes, Harmston, Lincoln.
- 1028 HENRY SMITH, The Grove, Cropwell Butler, Nottingham: the *Reserve Number* and *Highly Commended*; was dropped in March, 1883; bred by himself.

CLASS 117.—*Lincoln Shearling Rams.*

- 1041 THE EXECUTORS OF THE LATE W. L. F. HACK, Silk Willoughby, Sleaford, Lincolnshire: **FIRST PRIZE, 15*l.***; was dropped in March, 1884; bred by the late W. L. F. HACK.
- 1037 HENRY SMITH, The Grove, Cropwell Butler: **SECOND PRIZE, 10*l.***; was dropped in March, 1884; bred by himself.
- 1039 ROBERT WRIGHT, Nocton Heath, Lincoln: the *Reserve Number* and *Highly Commended*; was dropped in March, 1884; bred by himself.

CLASS 118.—*Lincoln Ram Lambs—Pens of Three.*

- 1049 HENRY SMITH, The Grove, Cropwell Butler: **FIRST PRIZE, 10*l.***; were dropped in March; bred by himself.
- 1052 JOHN PEARs, Mere, Lincoln: **SECOND PRIZE, 5*l.***; were dropped in February; bred by himself.
- 1051 HENRY DUDDING, Riby Grange, Great Grimsby, Lincolnshire: the *Reserve Number* and *Commended*; were dropped in February; bred by himself.

CLASS 119.—*Lincoln Shearling Ewes—Pens of Five.*

- 1054 ROBERT WRIGHT, Nocton Heath, Lincoln: **FIRST PRIZE, 15*l.***; were dropped in March, 1884; bred by himself.
- 1053 HENRY SMITH, The Grove, Cropwell Butler, Nottingham: **SECOND PRIZE, 10*l.***; were dropped in March, 1884; bred by himself.
- 1058 JOHN PEARs, Mere, Lincoln: the *Reserve Number* and *Highly Commended*; were dropped in March, 1884; bred by himself.

CLASS 120.—*Oxfordshire Down Two-Shear Rams.*

- 1061 JOHN TREADWELL, Upper Winchendon, Aylesbury, Buckinghamshire: **FIRST PRIZE, 15*l.***, for "Liverpool Freeland;" was dropped in February, 1883; bred by himself; sire, "Young Freeland;" dam by "Royal Liverpool."
- 1060 ALBERT BRASSEY, Heythrop Park, Chipping Norton, Oxfordshire: **SECOND PRIZE, 10*l.***, for "Shifford;" dropped in February, 1883; bred by himself; sire, "Royal Derby;" dam by Wallis' "No. 5."
- 1062 JOHN TREADWELL: the *Reserve Number* for "Shrewsbury Reserve;" was dropped in February, 1883; bred by himself; sire, "Baron Oxford;" dam by "Blenheim Champion."

CLASS 121.—*Oxfordshire Down Shearling Rams.*

- 1070 JOHN TREADWELL, Upper Winchendon: **FIRST PRIZE, 15*l.***, for "Royal Preston;" was dropped in February, 1884; sire, "Bicester;" dam by "Baron Newton": (1068) **SECOND PRIZE, 10*l.***, for "Baron Bicester;" was dropped in February, 1884; sire, "Bicester;" dam by Wallis' "No. 7": and (1071) the *Reserve Number* and *Highly Commended* for "Oxford Freeland;" was dropped in February, 1884; sire, "Young Freeland;" dam by "Duke of Oxford;" all bred by himself.

CLASS 122.—Oxfordshire Down Ram Lambs—Pens of Three.

- 1083 WILLIAM ARKELL, Hatherop, Fairford, Gloucestershire: **FIRST PRIZE**, 10*l.*; were dropped in January: and (1082) **SECOND PRIZE**, 5*l.*; were dropped in January and February; all bred by himself.
- 1081 WILLIAM HENRY FOX, Bradwell Grove, Burford, Oxfordshire: the *Reserve Number*; were dropped in January; bred by himself.

CLASS 123.—Oxfordshire Down Shearling Ewes—Pens of Five.

- 1087 ALBERT BRASSEY, Heythrop Park, Chipping Norton, Oxfordshire: **FIRST PRIZE**, 15*l.*, and (1016) **SECOND PRIZE**, 10*l.*; were dropped in February, 1884; bred by himself.
- 1089 THE COUNTESS OF CAMPERDOWN, Weston House, Shipston-on-Stour, Warwickshire: the *Reserve Number* and *Highly Commended*; were dropped in February, 1884; bred by herself; sire, Mr. Treadwell's "No. 8;" dam by Mr. Treadwell's "No. 18."

CLASS 124.—Shropshire Two-Shear Rams.

- 1092 HENRY AND ARTHUR BRADBURN, Pipe Place, Lichfield, Staffs: **FIRST PRIZE**, 15*l.*, for "The Judge;" was dropped in March, 1883; bred by Mr. J. Beach, The Hattons, Brewood; sire, "Royal Chief."
- 1098 THOMAS STEPHEN MINTON, Montford, Montford Bridge, R. S. O., Shropshire: **SECOND PRIZE**, 10*l.*; was dropped in 1883; bred by himself.
- 1105 THOMAS JAMES MANSELL, Dudmaston Lodge, Bridgnorth, Salop: **THIRD PRIZE**, 5*l.*; was dropped in May, 1883: and (1104) the *Reserve Number* and *Commended*; was dropped in February, 1883: both bred by himself.

CLASS 125.—Shropshire Shearling Rams.

- 1165 JOSEPH BEACH, The Hattons, Brewood, Staffs: **FIRST PRIZE**, 15*l.*; was dropped in February, 1884; bred by himself.
- 1166 LORD CHESHAM, Latimer, Chesham, Buckinghamshire: **SECOND PRIZE**, 10*l.*; was dropped in February, 1884; bred by himself.
- 1116 HENRY and ARTHUR BRADBURN, Pipe Place, Lichfield: **THIRD PRIZE**, 5*l.*; was dropped in March, 1884; bred by themselves; sire, "The Rector" (1769).
- 1173 THE EXECUTORS OF THE LATE WILLIAM GERMAN, Measham Lodge, Atherstone: the *Reserve Number* and *Highly Commended*; was dropped in March, 1884; bred by themselves; sire, "Brewood Chief."

CLASS 126.—Shropshire Ram Lambs—Pens of Three.

- 1210 RICHARD THOMAS, The Buildings, Baschurch, Shropshire: **FIRST PRIZE**, 10*l.*; were dropped in March; bred by himself.
- 1213 ROBERT LODER, M.P., Whittlebury, Towcester, Northamptonshire: **SECOND PRIZE**, 5*l.*; were dropped in March; bred by himself; sire, "Dudmaston Hero" (175); dam by "Royal Victor" (1030).
- 1214 WILLIAM HENRY BEACH, Gunstone House Farm, Codsall, Wolverhampton: the *Reserve Number* and *Highly Commended*; were dropped in March; bred by himself; sire, "Rebel Chief."

CLASS 127.—*Shropshire Shearling Ewes—Pens of Five.*

- 1225 LORD CHESHAM, Latimer, Chesham: FIRST PRIZE, 15*l.*; were dropped in March, 1884; bred by himself.
- 1226 JOHN EDWARD FARMER, Felton, Ludlow: SECOND PRIZE, 10*l.*; were dropped in February or March, 1884; bred by himself.
- 1216 HENRY and ARTHUR BRADBURN, Pipe Place, Lichfield: THIRD PRIZE, 5*l.*; were dropped in March, 1884; bred by themselves; sire, "The Rector" (1769).
- 1229 THOMAS JAMES MANSELL, Dudmaston Lodge, Bridgnorth, Shropshire: the *Reserve Number* and *Highly Commended*; were dropped in February and March 1884; bred by himself.

CLASS 128.—*Southdown Two-Shear Rams.*

- 1244 JEREMIAH JAMES COLMAN, M.P., Carrow House, Norwich: FIRST PRIZE, 15*l.*; was dropped March 1st, 1883; bred by himself.
- 1236 H.R.H. THE PRINCE OF WALES, K.G., Sandringham, Norfolk: SECOND PRIZE, 10*l.*; was dropped in March, 1883; bred by His Royal Highness.
- 1242 SIR WILLIAM THROCKMORTON, Bart., of Buckland, Faringdon, Berkshire: THIRD PRIZE, 5*l.*; was dropped in March, 1883; bred by himself.
- 1243 JEREMIAH JAMES COLMAN, M.P., Carrow House: the *Reserve Number* and *Commended*; was dropped in March, 1883; bred by himself.

CLASS 129.—*Southdown Shearling Rams.*

- 1259 SIR WILLIAM THROCKMORTON, Bart., of Buckland, Faringdon: FIRST PRIZE, 15*l.*, and (1258) SECOND PRIZE, 10*l.*; was dropped in March, 1884; bred by himself.
- 1261 JEREMIAH JAMES COLMAN, M.P., Carrow House, Norwich: THIRD PRIZE, 5*l.*; was dropped in March, 1884; bred by himself.
- 1247 H.R.H. THE PRINCE OF WALES, K.G., Sandringham: the *Reserve Number* and *Highly Commended*; was dropped in March, 1884; bred by His Royal Highness.

CLASS 130.—*Southdown Ram Lambs—Pens of Three.*

- 1264 H.R.H. THE PRINCE OF WALES, K.G., Sandringham: FIRST PRIZE, 10*l.*; were dropped in March; bred by His Royal Highness.

CLASS 131.—*Southdown Shearling Ewes—Pens of Five.*

- 1272 JEREMIAH JAMES COLMAN, M.P., Carrow House, Norwich: FIRST PRIZE, 15*l.*; were dropped in March, 1884; bred by himself.
- 1270 SIR WILLIAM THROCKMORTON, Bart., Buckland, Faringdon, Berkshire: SECOND PRIZE, 10*l.*; were dropped in March, 1884; bred by himself.
- 1268 CHARLES CHAPMAN, Frocester Court, Stonehouse, Gloucestershire: THIRD PRIZE, 5*l.*; were dropped in March 1884; bred by himself.
- 1271 GEORGE JONAS, Ickleton, Great Chesterford, Essex: the *Reserve Number* and *Highly Commended*; were dropped in February, 1884; bred by himself.

CLASS 132.—*Hampshire Down Two-Shear Rams.*

- 1276 HENRY LAMBERT, Babraham, Cambridge: **FIRST PRIZE**, 15*l.*; was dropped in January, 1883; bred by himself.
- 1281 FRANK R. MOORE, Littlecott, Upavon, Marlborough, Wilts: **SECOND PRIZE**, 10*l.*; was dropped in January, 1883; bred by himself.
- 1278 HENRY LAMBERT, Babraham: the *Reserve Number* and *Highly Commended*; was dropped in January, 1883; bred by himself.

CLASS 133.—*Hampshire Down Shearling Rams.*

- 1289 FRANK R. MOORE, Littlecott, Upavon, Marlborough, Wilts: **FIRST PRIZE**, 15*l.*; was dropped in January, 1884; bred by himself.
- 1287 HENRY LAMBERT, Babraham: **SECOND PRIZE**, 10*l.*: and (1286) the *Reserve Number* and *Highly Commended*; were dropped in January, 1884; bred by himself.

CLASS 134.—*Hampshire Down Ram Lambs—Pens of Three.*

- 1292 FRANK R. MOORE, Littlecott: **FIRST PRIZE**, 10*l.*; were dropped in January; bred by himself.

CLASS 135.—*Hampshire Down Shearling Ewes—Pens of Five.*

- 1297 FRANK R. MOORE, Littlecott: **FIRST PRIZE**, 15*l.*: and (1296) **SECOND PRIZE**, 10*l.*; were dropped in January, 1884; bred by himself.
- 1298 WILLIAM NEWTON, Gould's Grove, Benson, Oxfordshire: the *Reserve Number*; were dropped in January, 1884.

CLASS 136.—*Cheviot Shearling Rams.*

- 1299 JOHN ROBSON, Newton, Bellingham, Northumberland: **FIRST PRIZE**, 15*l.*; was dropped in April, 1884; bred by himself.
- 1301 JACOB ROBSON, Byrness, Otterburn, Northumberland: **SECOND PRIZE**, 10*l.*; was dropped in April, 1884; bred by himself; sire, "Cocklugs."
- 1300 JOHN ROBSON, Newton: the *Reserve Number*; was dropped in April, 1884; bred by himself.

CLASS 137.—*Cheviot Shearling Ewes—Pens of Five.*

- 1306 JACOB ROBSON, Byrness: **FIRST PRIZE**, 15*l.*; were dropped in April, 1884; bred by himself.
- 1307 JOHN ROBSON, Newton: **SECOND PRIZE**, 10*l.*; were dropped in April, 1884; bred by himself.
- 1308 MICHAEL WRIGHT, Charlton, Bellingham, Northumberland: the *Reserve Number*; were dropped in March, 1884; bred by himself.

CLASS 138.—*Other Short-woolled Rams.*

- 1310 FRANK SHEPHERD, The Brook, Colwall, Malvern: **FIRST PRIZE**, 10*l.*, for his Ryeland; was dropped in March, 1883: and (1309) **SECOND PRIZE**, 5*l.*; was dropped in March, 1884; both bred by himself.
- 1313 LORD POLTIMORE, Poltimore Park, Exeter: the *Reserve Number* for his Exmoor; was dropped in March, 1884; bred by himself.

CLASS 139.—Other Short-wolled Shearling Ewes—Pens of Five.

- 1314 JOSEPH SMITH, Thorpe Hall, Woodbridge, Suffolk: **FIRST PRIZE, 10l.**, for his Suffolk; were dropped about February 12th, 1884; bred by himself.
- 1316 LORD POLTIMORE, Poltimore Park, Exeter: **SECOND PRIZE, 5l.**: and the (1315) *Reserve Number* for his Exmoor; were dropped in March, 1884; bred by himself.

CLASS 140.—Lonk Rams.*

- 1318 JAMES NALTON, Horncliffe Stone Quarries, Rawtenstall, Lancashire: **FIRST PRIZE, 10l.**; was dropped about February, 1883; bred by Mr. Dearden, Nelson, Burnley.
- 1317 LAWRENCE RICHARD DUCKWORTH, Sheep Hey, Ramsbottom, Lancashire: **SECOND PRIZE, 5l.**; was dropped in 1882; bred by Mr. Earnshaw, Grindleton, Clithero.

CLASS 141.—Lonk Shearling Ewes—Pens of Five.*

- 1320 WILLIAM AMOS and JOHN CLARKSON, Swartha, Silsden, Leeds: **FIRST PRIZE, 10l.**: and (1319) **SECOND PRIZE, 5l.**: were dropped in March, 1884; bred by themselves and Mr. Dearden, Nelson, Lancashire.

CLASS 142.—Grey-faced Shearling Ewes—Pens of Five.*

- 1321 THOMAS FIRBANK KING, Edgley, West Witton, Bedale, Yorkshire: **FIRST PRIZE, 10l.**; were dropped in March and April, 1884; bred by himself.
- 1323 JAMES RIDLEY, Manor House, Bellerby, Leyburn, Bedale: **SECOND PRIZE, 5l.**; were dropped in April and May, 1884: and (1324) the *Reserve Number*; were dropped in April, 1884; all bred by himself.

CLASS 143.—Black-faced Mountain Rams.*

- 1331 ROBERT RAWLINSON, Docker Hall, Kendal, Westmoreland: **FIRST PRIZE, 10l.**, for "Mountain King;" was dropped in April, 1883; breeder unknown: and (1332) **SECOND PRIZE, 5l.**, for "Naaman 2nd;" was dropped in April, 1884; bred by himself; sire, "Naaman;" dam "Heather Girl."
- 1327 JOHN IRVING, Forest Hall, Kendal, Westmoreland: the *Reserve Number*; was dropped in April, 1883; bred by himself.

CLASS 144.—Black-faced Mountain Shearling Ewes—Pens of Five.*

- 1336 ROBERT RAWLINSON, Docker Hall, Kendal: **FIRST PRIZE, 10l.**; were dropped in April, 1884; bred by himself.
- 1335 JOHN IRVING, Forest Hall: **SECOND PRIZE, 5l.**; were dropped in April and May, 1884; bred by himself.
- 1334 JOHN ROBSON, Newton, Bellingham, Northumberland: the *Reserve Number*; were dropped in April, 1884; bred by himself.

CLASS 145.—Welsh Rams.*

- 1339 JOHN JONES, Central Buildings, Llandudno, Carnarvonshire: **FIRST PRIZE, 10l.**, for "Welsh Hero;" was dropped in April, 1881; bred by himself; sire, "Hero 1st."

- 1340 WILLIAM E. WILLIAMS, Gwerclas, Corwen, Merionethshire: SECOND PRIZE, 5*l.*, for "Prince Llewellyn 3rd;" was dropped in April, 1883; bred by himself; sire, "Prince Llewellyn;" dam, "Megan;" and (1342) the *Reserve Number* for "Ap Owen Glyndwr;" was dropped in April, 1882; bred by himself; sire, "Prince Llewellyn;" dam, "Megan."

CLASS 146.—*Welsh Shearling Ewes—Pens of Five.**

- 1344 JOHN JONES, Central Buildings, Llandudno: FIRST PRIZE, 10*l.*; were dropped in 1884; bred by himself; sire, "Welsh Hero," "Young Champion," and "Taffy": and (1343) SECOND PRIZE, 5*l.*; were dropped in 1884; bred by himself and Mr. D. Roberts, Pen-y-byrn, Llanbedr; sire, "Welsh Hero."

CLASS 147.—*Herdwick Rams.**

- 1352 EDWARD NELSON, Gatesgarth, Cockermouth, Cumberland: FIRST PRIZE, 10*l.*, for "Roofler;" was dropped in May, 1882; bred by himself; sire, "Sykes Cut Horns;" dam, "Striddle Britches," by "Beggar Lad."
- 1345 WILLIAM ABBOTT, Yew Tree, Coniston, Ambleside, Westmoreland: SECOND PRIZE, 5*l.*, for "Simon Pure;" was dropped in April, 1880; bred by himself; sire, "Imperial Prince."
- 1347 THOMAS BOWES, Fenwick, Broughton-in-Furness, Cumberland: the *Reserve Number* and *Commended*; was dropped in May, 1880; bred by himself; sire, "Fenwick."

CLASS 148.—*Herdwick Shearling Ewes—Pens of Five.**

- 1355 EDWARD NELSON, Gatesgarth, Cockermouth: FIRST PRIZE, 10*l.*; were dropped in May, 1884; bred by himself.
- 1353 WILLIAM ABBOTT, Yew Tree, Coniston, Ambleside: SECOND PRIZE, 5*l.*; were dropped in March and April, 1884; bred by himself.

CLASS 149.—*Wensleydale Rams.**

- 1362 JOHN LAMBERT, Swinithwaite, Bedale, Yorkshire: FIRST PRIZE, 10*l.*; was dropped in March, 1884; bred by himself.
- 1361 JAMES PILKINGTON, Swinithwaite Hall, Bedale: SECOND PRIZE, 5*l.*; was dropped in March, 1883; bred by Mr. J. Lambert, Hall Farm, Swinithwaite.
- 1357 JOHN and HENRY DOUTHWAITE, Pasture House, Crake Hall, Bedale: the *Reserve Number* and *Highly Commended*; was dropped in March, 1883; bred by Mr. John Willis, Carperby, Bedale.

CLASS 150.—*Wensleydale Shearling Ewes—Pens of Five.**

- 1363 JOHN and HENRY DOUTHWAITE: FIRST PRIZE, 10*l.*; were dropped in March, 1884; bred by themselves.
- 1364 JAMES PILKINGTON: SECOND PRIZE, 5*l.*; were dropped in February and March, 1884; bred by himself.

PIGS.

CLASS 151.—Large White Breed—Boars farrowed in the Year 1882 or 1883.

- 1366 JOSEPH DAVIES, Venn's Green, Marden, Hereford: **FIRST PRIZE, 10*l.***, for "Jonathan;" was farrowed May 15th, 1882; bred by Mr. John Barron, Borrowash, Derby; sire, "King David;" dam, "Miss Beddall," by "Victor 4th."
- 1370 ROBERT ASHCROFT, Fermor Arms Hotel, Rufford, Ormskirk, Lancashire: **SECOND PRIZE, 5*l.***, for "Samson;" was farrowed March 4th, 1882; bred by Mr. John Hesketh, Rosaker, Preston.

CLASS 152.—Large White Breed—Boars farrowed in the Year 1884.

- 1371 JOSEPH ASHFORTH, The Rookery, Dronfield, Sheffield: **FIRST PRIZE, 10*l.***, for "The Don;" was farrowed July 8th; bred by himself; sire, "John" (93); dam, "Lady Sheaf," by "Yorkshire Lad."
- 1373 F. A. WALKER-JONES, Little Mollington, Chester: **SECOND PRIZE, 5*l.***; was farrowed January 20th; bred by himself; sire, "Madman;" dam, "Birkenhead Lady."

CLASS 153.—Large White Breed—Breeding Sows, farrowed previously to or in the Year 1884.

- 1380 LIEUT.-COL. H. PLATT, Gorddinog, Bangor, Carnarvonshire: **FIRST PRIZE, 10*l.***, for "Sal;" was farrowed in 1881; bred by Mr. J. Nuttall, Longfield, Heywood, Lancashire.
- 1376 PHILIP ASHCROFT, Hesketh Arms Hotel, Rufford, Ormskirk, Lancashire: **SECOND PRIZE, 5*l.***, for "Lancashire Lass;" was farrowed July 10th, 1883; bred by himself; sire, "Ben" (59); dam, "Lilly," by "Tiger."
- 1378 CHARLES ELMHIRST DUCKERING, Hibaldstow Cliff, Kirtton Lindsey, Lincolnshire: **THIRD PRIZE, 3*l.***, for "Empress;" was farrowed June 22nd, 1883; bred by himself.
- 1384 F. A. WALKER-JONES, Little Mollington, Chester: the *Reserve Number* and *Highly Commended*; was farrowed in 1883; bred by himself.

CLASS 154.—Large White Breed—Pens of Three Breeding Sow Pigs, farrowed in the Year 1885.

- 1393 F. A. WALKER-JONES, Little Mollington: **FIRST PRIZE, 10*l.***; were farrowed January 10th; bred by himself; sire, "Lieut.-Col. II.;" dam, "Lady of Lea."
- 1395 TOM STRICKLAND, Thirsk Junction, Thirsk, Yorkshire: **SECOND PRIZE, 5*l.***; were farrowed January 1st; and (1394) **THIRD PRIZE, 3*l.***; were farrowed January 2nd; all bred by himself.
- 1389 JOSEPH NUTTALL, Longfield, Heywood, Lancashire: the *Reserve Number* and *Commended*; were farrowed January 6th; bred by himself; dam by "Joseph."

CLASS 155.—Middle White Breed—Boars farrowed in the Year 1882 or 1883.

- 1397 ROBERT NEWSHAM, 39, Sandy Lane, Skelmersdale, Lancashire: **FIRST PRIZE, 10*l.***, for "Peter Plunger;" was farrowed May 14th, 1883; bred by himself; sire, "Peter."

- 1399 PHILIP ASCROFT, Hesketh Arms Hotel, Rufford, Ormskirk, Lancashire: **SECOND PRIZE, 5l.**; was farrowed May 1st, 1883; bred by Mr. Charles Stockdale.
- 1400 LIEUT.-COL. H. PLATT, Gorddinog, Bangor, Carnarvonshire: the *Reserve Number* for "Billy;" was farrowed January 2nd, 1883; bred by himself; sire, "Samson;" dam, "Bobtail."

CLASS 156.—Middle White Breed—Boars farrowed in the Year 1884.

- 1404 F. A. WALKER-JONES, Little Mollington, Chester: **SECOND PRIZE, 5l.**; was farrowed March 21st; bred by himself; sire, "Punch;" dam, "Miss Leeds."

CLASS 157.—Middle White Breed—Breeding Sows farrowed previously to or in the Year 1884.

- 1408 PHILIP ASCROFT, Hesketh Arms Hotel, Rufford, Ormskirk: **FIRST PRIZE, 10l.**, for "Kitty;" was farrowed August 1st, 1883; bred by himself; sire, "Peter" (185); dam, "Borrower," by "Jack."
- 1418 F. A. WALKER-JONES, Little Mollington: **SECOND PRIZE, 5l.**; was farrowed August 3rd, 1883; bred by himself; sire, "Dynamite;" dam, "Miss Jackson."
- 1409 LIEUT.-COL. H. PLATT, Gorddinog, Bangor, Carnarvonshire: **THIRD PRIZE, 3l.**, for "Violet;" was farrowed June 1st, 1883; bred by himself; sire, "Samson;" dam, "Lady Sutton."
- 1417 F. A. WALKER-JONES, Little Mollington: the *Reserve Number* and *Highly Commended*; was farrowed November 14th, 1882; bred by himself; sire, "What's Wanted;" dam, "Duchess II."

CLASS 158.—Middle White Breed—Pens of Three Breeding Sow Pigs, farrowed in the Year 1885.

- 1421 JOSEPH NUTTALL, 11, Longfield, Heywood, Lancashire: **FIRST PRIZE, 10l.**; were farrowed January 20th; bred by himself; dam by "Joseph."
- 1425 TOM STRICKLAND, Thirsk Junction, Thirsk, Yorkshire: **SECOND PRIZE, 5l.**; were farrowed January 3rd; bred by himself.
- 1422 EDWARD HENRY TOULMIN, The Warren, Wotton-under-Edge, Gloucestershire: the *Reserve Number*; were farrowed April 30th; bred by himself.

CLASS 159.—Small White Breed—Boars farrowed in the Year 1882 or 1883.

- 1429 PHILIP ASCROFT, Hesketh Arms Hotel, Rufford, Ormskirk: **FIRST PRIZE, 10l.**, for "Little John;" was farrowed October 20th, 1883; bred by himself; sire, "Captain" (205); dam, "Shortnose," by "Sweetmeat."
- 1433 F. A. WALKER-JONES, Little Mollington, Chester: **SECOND PRIZE, 5l.**, for "Albert Victor;" was farrowed October 29th, 1882; bred by himself; sire, "Star;" dam, "Snowdrop."
- 1434 JOHN BRETTELL WILKES, Glasfryn, Llangybi, Chwilog, R. S. O., Carnarvonshire: **THIRD PRIZE, 3l.**, for "Always Ready;" was farrowed in July, 1883; bred by the Earl of Ellesmere, Worsley Hall, Manchester.
- 1427 HER MAJESTY THE QUEEN, The Prince Consort's Shaw Farm, Windsor: the *Reserve Number* and *Highly Commended* for "Regulus;" was farrowed September 20th, 1883; bred by Her Majesty; sire, "Royalist;" dam, "Kirtley," by "Marshall."

CLASS 160.—*Small White Breed—Boars farrowed in the Year 1884.*

- 1437 LORD MORETON, M.P., Tortworth Court, Falfield, Gloucestershire : **FIRST PRIZE, 10*l.***; was farrowed January 6th; bred by himself; sire, "Linnet;" dam, "Princess 3rd," by "Uncle Tom."
- 1439 THE EARL OF RADNOR, Coleshill House, Highworth, Wiltshire : **SECOND PRIZE, 5*l.***; was farrowed July 3rd; sire, "Lord Derby;" dam, "Doxey," by "Warwick": and (1438) the *Reserve Number*; was farrowed September 2nd; sire, "Lord Derby;" dam, "Gipsy," by "York;" both bred by himself.

CLASS 161.—*Small White Breed—Breeding Sows farrowed previously to or in the Year 1884.*

- 1452 F. A. WALKER-JONES, Little Mollington, Chester : **FIRST PRIZE, 10*l.***; was farrowed December 17th, 1883; bred by himself; sire, "Roger;" dam, "Snowdrop."
- 1445 THE EARL OF RADNOR, Coleshill House, Highworth, Wiltshire : **SECOND PRIZE, 5*l.***, for "Brighton;" was farrowed January 17th, 1884; bred by himself; sire, "Lord Derby;" dam, "Coleshill," by "Warwick."
- 1443 LORD MORETON, M.P., Tortworth Court : **THIRD PRIZE, 3*l.***; was farrowed July 1st, 1884; in-pig; bred by himself; sire, "Linnet;" dam, "Lady Bridgnorth," by "Uncle Tom."
- 1444 LIEUT.-COL. H. PLATT, Gorddinog, Bangor, Carnarvonshire; the *Reserve Number* and *Highly Commended* for "Niny;" was farrowed March 20th, 1883; bred by Lord Moreton, Tortworth Court, Falfield, Gloucestershire.

CLASS 162.—*Small White Breed—Pens of Three Breeding Sow Pigs, farrowed in the Year 1885.*

- 1459 THE EARL OF RADNOR, Coleshill House : **FIRST PRIZE, 10*l.***; were farrowed January 8th; sire, "Lord Derby;" dam, "Spot;" and (1458) **SECOND PRIZE, 5*l.***; were farrowed January 5th; sire, "Champion;" dam, "Daisy 2nd," by "Coleshill;" all bred by himself.
- 1456 JOSEPH ASHFORTH, The Rookery, Dronfield, Sheffield : **THIRD PRIZE, 3*l.***; were farrowed January 14th; bred by himself; sire, "Peter;" dam, "Purity," by "Tit Bit."
- 1455 HER MAJESTY THE QUEEN, The Prince Consort's Shaw Farm, Windsor : the *Reserve Number*; were farrowed January 4th; bred by Her Majesty the Queen; sire, "Royalist;" dam, "Princess Rose."

CLASS 163.—*Small Black Breed—Boars farrowed in the Year 1882 or 1883.*

- 1465 CHARLES ELMHIRST DUCKERING, Hibaldstowe Cliff, Kirton-in-Lindsay, Lincolnshire : **FIRST PRIZE, 10*l.***, for "King John;" was farrowed November 15th, 1883; bred by himself.
- 1467 THE DUKE OF HAMILTON AND BRANDON, K.T., Easton Park, Wickham Market, Suffolk : **SECOND PRIZE, 5*l.***, for "The Prince;" was farrowed September 4th, 1883; bred by himself; sire, "Robert the Devil;" dam, "Young Diamond," by "Rattling Jack."
- 1462 GEORGE PETTIT, The Firs, Friston, Saxmundham, Suffolk : the *Reserve Number* and *Commended*; was farrowed March 25th, 1883; bred by himself; sire, "Danger;" dam, "Lucy," by "Lord Beaconsfield."

CLASS 164.—*Small Black Breed—Boars farrowed in the Year 1884.*

- 1475 CHARLES ELMHIRST DUCKERING, Hibaldstowe Cliff: **FIRST PRIZE, 10*l.***, for "The Friar;" was farrowed August 8th; bred by himself.
- 1472 GEORGE PETTIT, The Firs, Friston: **SECOND PRIZE, 5*l.***; was farrowed November 5th; bred by himself; sire, "Gladstone;" dam, "Vanity."
- 1476 THE DUKE OF HAMILTON AND BRANDON, K.T., Easton Park: the *Reserve Number* and *Commended* for "Hero;" was farrowed August 23rd; bred by himself; sire, "Robert the Devil;" dam, "Old Diamond," by "Doncaster."

CLASS 165.—*Small Black Breed—Breeding Sows farrowed previously to or in the Year 1884.*

- 1481 CHARLES ELMHIRST DUCKERING, Hibaldstowe Cliff, Kirton-in-Lindsey: **FIRST PRIZE, 10*l.***, for "Betty;" was farrowed January 19th, 1884; bred by himself.
- 1479 GEORGE PETTIT, The Firs, Friston, Saxmundham: **SECOND PRIZE, 5*l.***; was farrowed March 20th, 1884; in-pig; bred by himself; sire, "Negro;" dam, "Nancy," by "Lord Beaconsfield."
- 1485 JOSEPH ALFRED SMITH, Rise Hall, Akenham, Ipswich: the *Reserve Number* and *Highly Commended* for "Galatea;" was farrowed June 2nd, 1883; in-pig; bred by himself; sire, "Lord Essex;" dam, "Perseverance," by "Parnell."

CLASS 166.—*Small Black Breed—Pens of Three Breeding Sow Pigs, farrowed in the Year 1885.*

- 1487 THE REV. WILLIAM HOOPER, Chilfrome Rectory, Dorchester: **FIRST PRIZE, 10*l.***; were farrowed January 20th; bred by himself; sire, "Gipsy King;" dam, "Lady Sutton."
- 1488 THE DUKE OF HAMILTON AND BRANDON, K.T., Easton Park, Wickham Market, Suffolk: **SECOND PRIZE, 5*l.***; were farrowed January 9th; sire, "Sir Arthur;" dam, "Gipsy," by "Robert the Devil;" and (1489) the *Reserve Number*; were farrowed January 10th; sire, "Sir Arthur;" dam, "Gipsy Queen," by "Robert the Devil;" all bred by himself.

CLASS 167.—*Berkshire Breed—Boars, farrowed in the Year 1882 or 1883.*

- 1494 EDWARD TOMBS, Manor Farm, Shilton, Bampton, Oxfordshire: **FIRST PRIZE, 10*l.***; was farrowed December 8th, 1883; bred by Mr. W. Pinnock, Taynton, Burford, Oxfordshire; sire, "Malcolm;" dam, "Taynton I."
- 1491 LIEUT.-COLONEL J. H. BAGOT LANE, King's Bromley Manor, Lichfield, Staffordshire: **SECOND PRIZE, 5*l.***, for "Bromley;" was farrowed July 3rd, 1882; bred by the Executors of the late Arthur Stewart, Saint Bridge Farm, Gloucester.
- 1493 RUSSELL SWANWICK, Royal Agricultural College Farm, Cirencester, Gloucestershire: **THIRD PRIZE, 3*l.***, for "Sambo" (112); was farrowed February 16th, 1883; bred by himself; sire, "Duke of Newport;" dam, "Sally" (112), by "Gloucester" (2).

CLASS 168.—*Berkshire Breed—Boars farrowed in the Year 1884.*

- 1509 EDWARD TOMBS, Manor Farm, Shilton, Bampton: **FIRST PRIZE, 10*l.***, for "Shilton;" was farrowed January 25th; bred by himself; sire, "Tim Whiffler;" dam, "Lily," by "Goldsmith."
- 1502 WILLIAM CORP, Clanville, Castle Cary, Somerset: **SECOND PRIZE, 5*l.***, for "Jumbo 2nd;" was farrowed April 10th; bred by himself; sire, "Tinker;" dam, "Blue Bell," by "Samphire."
- 1506 RUSSELL SWANWICK, Royal Agricultural College Farm, Cirencester, Gloucestershire: **THIRD PRIZE, 3*l.***; was farrowed August 1st; bred by himself; sire, "Artful Joe;" dam, "Stumpy 16th," by "Timothy 2nd": and (1507) the *Reserve Number*; was farrowed May 20th; bred by himself; sire, "Newport 2;" dam, "Sally" (117), by "Colonel."

CLASS 169.—*Berkshire Breed—Breeding Sows, farrowed previously to or in the Year 1884.*

- 1519 WILLIAM CORP, Clanville, Castle Cary, Somerset: **FIRST PRIZE, 10*l.***; was farrowed January 2nd, 1884; in-pig; bred by himself; sire, "Tinker;" dam, "Blue Bell," by "Samphire."
- 1530 GAIUS FOLLETT VINCENT, Compton Valence, Dorchester: **SECOND PRIZE, 5*l.***, for "Queen of Compton;" was farrowed January 23rd, 1884; in-pig; bred by himself; sire, "Prince;" dam, "Princess 2nd," by "Warwick 1st."
- 1522 CHARLES ELMHIRST DUCKERING, Hibaldstowe Cliff, Kirtton-in-Lindsey, Lincolnshire: **THIRD PRIZE, 3*l.***, for "Primrose;" was farrowed July 24th, 1883; bred by himself.
- 1520 WILLIAM CORP, Clanville: the *Reserve Number* and *Highly Commended*; was farrowed April 10th, 1884; in-pig; bred by himself; sire, "Tinker;" dam, "Blue Bell," by "Samphire."

CLASS 170.—*Berkshire Breed—Pens of Three Breeding Sow Pigs, farrowed in the Year 1885.*

- 1542 GAIUS FOLLETT VINCENT, Compton Valence, Dorchester: **FIRST PRIZE, 10*l.***, for "Young Princesses;" were farrowed January 5th; bred by himself; sire, "Tinker;" dam, "Princess 2nd," by "Warwick 1st."
- 1546 THE EXECUTORS OF THE LATE ARTHUR STEWART, Saint Bridge Farm, Gloucester: **SECOND PRIZE, 5*l.***; were farrowed January 15th; bred by themselves; sire, "Lord Hereford;" dam, "Kingscott IV.," by "King Birt."
- 1543 THOMAS PRICE WILLIS, The Elms, Winslow, Bucks: **THIRD PRIZE, 3*l.***; were farrowed March 9th; bred by himself; sire, "Baxter;" dam, "Buxom Lass 1st," by "Short Tail."

CLASS 171.—*Tamworth Breed—Boars farrowed in the Year 1882 or 1883.*

- 1548 GEORGE MANDER ALLENDER, Solna, Roehampton, Surrey: **FIRST PRIZE, 10*l.***, for "Sir Hugh;" was farrowed August 11th, 1883; bred by himself; sire, "St. Lubbock;" dam, "Tamworth Lass."
- 1549 MESSRS. J. AND W. H. MITCHELL, Springfield Farm, Hall Green, Birmingham: **SECOND PRIZE, 5*l.***, for "Samson;" was farrowed in November, 1882; bred by Mr. Thomas Watson, Over Whitacre, Birmingham.

CLASS 172.—Tamworth Breed—Boars, farrowed in the Year 1884.

- 1552 MESSRS. J. & W. H. MITCHELL, Springfield Farm: **FIRST PRIZE, 10l.**, for "Samson II.;" was farrowed June 13th; bred by themselves; sire, "Samson;" dam, "Sylvia."
- 1550 GEORGE MANDER ALLENDER, Solna, Roehampton: **SECOND PRIZE, 5l.**, for "Peeping Tom;" was farrowed August 17th; sire, "Sir Hugh;" dam, "Lady Godiva;" and (1551) the *Reserve Number* for "Joe;" was farrowed July 20th; sire, "St. Lubbock;" dam, "Tamworth Lass;" both bred by himself.

CLASS 173.—Tamworth Breed—Breeding Sows, farrowed previously to or in the Year 1884.

- 1557 GEORGE MANDER ALLENDER, Solna: **FIRST PRIZE, 10l.**, for "Tamworth Lady;" was farrowed July 20th, 1884; in-pig; bred by himself; sire, "St. Lubbock;" dam, "Tamworth Lass": (1555) **SECOND PRIZE, 5l.**, for "Lady Foster;" was farrowed August 11th, 1883; sire, "St. Lubbock;" dam, "Tamworth Lass": and (1558) the *Reserve Number* and *Commended* for "Lady Foster 2nd;" was farrowed August 8th, 1884; in-pig; sire, "The Peeler;" dam, "Lady Foster," by "St. Lubbock;" all bred by himself.

CLASS 174.—Tamworth Breed—Pens of Three Breeding Sow Pigs farrowed in the Year 1885.

- 1562 GEORGE MANDER ALLENDER, Solna: **FIRST PRIZE, 10l.**; were farrowed February 8th; sire, "Sir Hugh;" dam, "Lady Godiva": (1561) **SECOND PRIZE, 5l.**; were farrowed February 8th; sire, "Sir Hugh;" dam, "Lady Godiva:" and (1563) the *Reserve Number*; were farrowed February 11th; sire, "The Peeler;" dam, "Lady Foster," by "Sir Lubbock;" all bred by himself.

CHEESE.

Three to each Entry.

CLASS 175.—Cheddar—not less than 50 lbs., and not exceeding 80 lbs. each.

- 1 THOMAS ALLEN, Crookwood, Devizes, Wilts: **FIRST PRIZE, 10l.**
- 9 ROBERT GEORGE NORMAN, Manor Farm, Chetmole, Sherborne, Dorset: **SECOND PRIZE, 5l.**
- 10 MARK JOHN STEWART, Southwick, Dumfries, N.B.: the *Reserve Number* and *Highly Commended*.

CLASS 176.—Loaf-Cheddar.

- 12 THOMAS ALLEN, Crookwood: **FIRST PRIZE, 10l.**
- 14 WILLIAM CORP, Clanville, Castle Carey, Somerset: **SECOND PRIZE, 5l.**
- 18 ROBERT GEORGE NORMAN, Manor Farm, Chetmole: the *Reserve Number* and *Highly Commended*.

CLASS 177.—*Cheshire, above 50 lbs., and not exceeding 100 lbs. each.**

- 26 ALFRED DAVIES, Stockton Hall, Malpas, Cheshire: FIRST PRIZE, 10*l*.
 27 GEORGE DUTTON, Peckforton, Tarporley, Cheshire: SECOND PRIZE, 5*l*.
 28 JOHN DUTTON, Swanley Hall, Nantwich, Cheshire: THIRD PRIZE, 3*l*.
 36 GEORGE MOSFORD, Tattenhall, Cheshire: the *Reserve Number* and *Highly Commended*.

CLASS 178.—*Cheshire, not exceeding 50 lbs. each.**

- 47 ALFRED DAVIES, Stockton Hall: FIRST PRIZE, 10*l*.
 54 GEORGE MOSFORD, Tattenhall: SECOND PRIZE, 5*l*.
 55 THOMAS PARTON, Chorlton, Nantwich: THIRD PRIZE, 3*l*.
 49 RICHARD FEARNALL, Lea Hall, Aldford, Chester: the *Reserve Number* and *Highly Commended*.

CLASS 179.—*Lancashire, exceeding 40 lbs. each.**

- 70 JAMES COWPE, Fir Trees Farm, Goosnargh, Preston: FIRST PRIZE, 10*l*.
 62 HUGH BLUNDELL, Threlfall Farm, Whittingham, Preston: SECOND PRIZE, 5*l*.
 78 HENRY KIRKHAM, Little Marton, Blackpool, Lancashire: THIRD PRIZE, 3*l*.
 82 SAMUEL SALTHOUSE, Roseacre, Kirkham, Lancashire; the *Reserve Number* and *Highly Commended*.

CLASS 180.—*Lancashire, not exceeding 40 lbs. each.**

- 103 RICHARD DUNDERDALE, Buitrow, Scotsforth, Lancashire: FIRST PRIZE, 10*l*.
 101 JAMES COWPE, Fir Trees Farm: SECOND PRIZE, 5*l*.
 95 HUGH BLUNDELL, Threlfall Farm: THIRD PRIZE, 3*l*.
 107 THOMAS KIRK, Sandbank, Whittingham, Preston: the *Reserve Number* and *Highly Commended*.

CLASS 181.—*Derbyshire.*

- 126 THE ALDFORD CHEESE FACTORY COMPANY, Buerton, Saighton, Chester: FIRST PRIZE, 10*l*.
 132 JAMES SCOTTON, Cheese Factory, Brailsford, Derby: SECOND PRIZE, 5*l*.
 131 WILLIAM SAINT, Barton Park, Church Broughton, Derby: the *Reserve Number* and *Highly Commended*.

CLASS 184.—*Stilton.*

- 138 HENRY MORRIS, Manor House, Saxelby, Melton Mowbray: SECOND PRIZE, 5*l*.

CLASS 187.—*Hard Skim-Milk.*

- 153 GEORGE HARRIS, Court House Farm, Cam., Dursley: FIRST PRIZE, 10*l*.
 150 THOMAS ALLEN, Crookwood Farm, Devizes: SECOND PRIZE, 5*l*.

(No awards in CLASSES 182 and 183, 185 and 186.)

BUTTER.

188.—*Six Pounds of Fresh, absolutely free from Salt.*

- 191 JOHN SWAN, Sturfield, Lincoln: FIRST PRIZE, 5*l*.
 181 MRS. W. P. MILLER, Merlewood, Grange-over-Sands, Lancashire: SECOND PRIZE, 3*l*.
 199 MRS. A. WHITCOMB, Knapp Farm, Pixley, Ledbury, Herefordshire: THIRD PRIZE, 2*l*.
 200 JOSEPH WILSON, Wilson's Row, Penrith, Cumberland: the *Reserve Number* and *Highly Commended*.

189.—*Six Pounds, slightly Salted.**

- 217 RICHARD FOWLER, Broughton Farm, Aylesbury, Bucks: FIRST PRIZE, 5
 237 MRS. W. P. MILLER, Merlewood: SECOND PRIZE, 4*l*.
 263 THE REV. L. C. WOOD, Singleton Vicarage, Poulton-le-Fylde: THIRD PRIZE, 3*l*.
 261 MRS. A. WHITCOMB, Knapp Farm: FOURTH PRIZE, 2*l*.
 220 RICHARD HALL, Swarbrick Hall, Kirkham, Lancashire: FIFTH PRIZE, 1*l*.
 206 THOMAS BRADLEY, Brick Bank Farm, Nenbury, Macclesfield: the *Reserve Number* and *Highly Commended*.

(No award in CLASS 190.)

HIVES, HONEY, &c.†

CLASS 191.—*Frame Hives for general use in an Apiary. Price not to exceed 15s.*

- 286 DINES AND SON, Maldon, Essex: FIRST PRIZE, 1*l*.
 283 S. J. BALDWIN, The Apiary, Bromley, Kent: SECOND PRIZE, 15s.
 282 A. T. ADAMS, Crick, Rugby: THIRD PRIZE, 10s.

CLASS 192.—*Frame Hives for Cottagers' use. Price not to exceed 10s. 6d.*

- 300 DINES AND SON, Maldon: FIRST PRIZE, 1*l*.
 297 A. T. ADAMS, Crick, Rugby: SECOND PRIZE, 15s.
 298 S. J. BALDWIN, Bromley: THIRD PRIZE, 10s.

CLASS 193.—*Collection of Hives and Bee Furniture.*

- 313 G. NEIGHBOUR AND SONS, 149, Regent Street, London: FIRST PRIZE, 2*l*.
 312 W. P. MEADOWS, Syston, Leicester: SECOND PRIZE, 1*l*. 10s.
 311 S. J. BALDWIN, Bromley: THIRD PRIZE, 1*l*.

† Prizes given by the British Beekeepers' Association.

*Award of Prizes at Preston.***CLASS 194.—Supers of Honey (not being Sectional).**

- 326 WOODLEY BROTHERS, Donnington Road, Reading : FIRST PRIZE, 1*l*.
 325 W. WOODLEY, World's End, Newbury, Berks : SECOND PRIZE, 10*s*.
 319 J. COTTERELL, Bowdon, Cheshire : THIRD PRIZE, 5*s*.

CLASS 195.—Twelve 2-lb. Sections of Comb Honey.

- 329 MISS M. L. GAYTON, Much Hadham, Herts : FIRST PRIZE, 1*l*.
 327 THE BEE AND FRUIT FARMING Co., Hockenden, St. Mary Cray, Kent :
 SECOND PRIZE, 10*s*.
 338 WOODLEY BROTHERS, Reading : THIRD PRIZE, 5*s*.

CLASS 196.—Twelve 1-lb. Sections of Comb Honey.

- 345 MISS M. L. GAYTON : FIRST PRIZE, 1*l*.
 341 THE BEE AND FRUIT FARMING Co. : SECOND PRIZE, 10*s*.
 359 W. WOODLEY : THIRD PRIZE, 5*s*.

CLASS 197.—Run or Extracted Honey.

- 368 MISS M. L. GAYTON : FIRST PRIZE, 1*l*.
 380 W. WOODLEY : SECOND PRIZE, 10*s*.
 383 WOODLEY BROTHERS : THIRD PRIZE, 5*s*.

CLASS 198.—Samples of Comb Foundation.

- 385 G. NEIGHBOUR AND SONS : SECOND PRIZE, 10*s*.

POULTRY.

By "Cocks," "Hens," "Drakes," "Ducks," "Ganders," and "Geese," are meant birds hatched previous to January 1st, 1885, and by "Cockerels," "Pullets," "Young Drakes," "Ducklings," "Young Ganders," and "Goslings," are meant birds hatched in 1885, previous to June 1st.

FOWLS.**CLASS 1.—Dark Brahma Cock and Three Hens.**

- 6 JOHN MAUGHAN, Knotty Ash, Liverpool : FIRST PRIZE, 3*l*.
 4 RECHAB HOLLAND, 11, Brackley Road, Buckingham : SECOND PRIZE, 2*l*.
 10 JOHN TAYLOR, Alsagar, Stoke-on-Trent : THIRD PRIZE, 1*l*.
 1 MRS. E. BIRD, Glenduckie, Newburgh, Fifeshire : the Reserve Number.

CLASS 2.—Dark Brahma Cockerel and Three Pullets.

- 14 ISAAC FOSTER, Skipton Road, Silsden, Leeds : FIRST PRIZE, 3*l*.
 12 ALFRED ASHTON, Kirmincham Lodge, Holmes Chapel, Cheshire : SECOND PRIZE, 2*l*.

- 15 RECHAS HOLLAND, 11, Brackley Road, Buckingham : THIRD PRIZE, 1*l*.
16 CHARLES D. JONES, Bryn-y-mor, Hastings : the *Reserve Number*.

CLASS 3.—*Light Brahma Cock and Three Hens.*

- 29 L. C. R. NORRIS-ELYE, Orsett, Essex : FIRST PRIZE, 3*l*.
21 MR. N. A. BOARDMAN, Thorn Leigh, Burton, Westmoreland : SECOND PRIZE, 2*l*.
26 JOHN MAUGHAN, Knotty Ash, Liverpool : THIRD PRIZE, 1*l*.
30 L. C. R. NORRIS-ELYE : the *Reserve Number*.

CLASS 4.—*Light Brahma Cockerel and Three Pullets.*

- 31 ALFRED ASHTON, Kirmincham Lodge, Holmes Chapel : FIRST PRIZE, 3*l*.
33 MRS. N. A. BOARDMAN, Thorn Leigh, Burton, Westmoreland : SECOND PRIZE, 2*l*.
32 REV. HAROLD BURTON, Fauls Vicarage, Whitchurch : THIRD PRIZE, 1*l*.

CLASS 5.—*Cochin Cock and Three Hens.*

- 46 GEORGE H. PROCTOR, Floss House, Durham : FIRST PRIZE, 3*l*.
37 THOMAS ASPDEW, Peel Bank, Church, Lancashire : SECOND PRIZE, 2*l*.
40 ALFRED E. W. DARBY, Little Ness, Shrewsbury : THIRD PRIZE, 1*l*.
38 MRS. BARTON, Warton Grange, Carnforth, Lancashire : the *Reserve Number*.

CLASS 6.—*Cochin Cockerel and Three Pullets.*

- 50 RUFUS MITCHELL, Therpe House, Idle, Bradford, Yorkshire : FIRST PRIZE, 3*l*.
49 ROBERT R. FOWLER, Prebendal Poultry Farms, Aylesbury : SECOND PRIZE, 2*l*.
53 MRS. JOHN SCRIVEN, Normandy Villa, Shipley, Yorkshire : THIRD PRIZE, 1*l*.
51 TOM SOWERBY, Cuxwold Hall, Caistor : the *Reserve Number*.

CLASS 7.—*Langshan Cock and Three Hens.*

- 54 ARTHUR E. DAVIES, Aldborough Rectory, Hanworth, S.O., Norwich : FIRST PRIZE, 3*l*.
62 THOMAS THOMPSON, Prospect House, Hest Bank, Lancaster : SECOND PRIZE, 2*l*.
56 HENRY M. ORME, Lutwicke, Slinfold, Horsham, Sussex : THIRD PRIZE, 1*l*.
59 HUGH PARKINSON, Poulton-le-Fylde : the *Reserve Number*.

CLASS 8.—*Langshan Cockerel and Three Pullets.*

- 65 ARTHUR C. DAVIES, Aldborough Rectory : FIRST PRIZE, 3*l*.
66 HENRY M. ORME, Lutwicke : SECOND PRIZE, 2*l*.
67 ROBERT W. WALLACE, East Stand House, Arretton, Newport, Isle of Wight : THIRD PRIZE, 1*l*.

CLASS 9.—Houdan Cock and Three Hens.

- 69 J. T. CALVERT, Keighley, Yorkshire: **FIRST PRIZE, 3*l*.**
 71 PHILIP HANSON, Old Windsor: **SECOND PRIZE, 2*l*.**
 73 MRS. IRVING, 19, Edentown, Carlisle: **THIRD PRIZE, 1*l*.**
 76 SAMUEL W. THOMAS, Glasfryn, Cockett, Swansea: the *Reserve Number* and *Highly Commended*.

CLASS 10.—Houdan Cockerel and Three Pullets.

- 78 PHILIP HANSON, Old Windsor: **FIRST PRIZE, 3*l*.**
 79 RALPH MARES, 134, Tockholes Road, Darwen, Lancashire: **SECOND PRIZE, 2*l*.**
 77 JOHN DIXON, 13, South Street, Durham: **THIRD PRIZE, 1*l*.**

CLASS 11.—Plymouth Rock Cock and Three Hens.

- 90 JAMES HOLDEN, Simonstone, Padiham, Burnley: **FIRST PRIZE, 3*l*.**
 81 EDWARD ANDERSON, 42, Perryfield Street, Maidstone: **SECOND PRIZE, 2*l*.**
 92 JAMES OLLERHEAD, The Gardens, Wimbledon House, Wimbledon, Surrey: **THIRD PRIZE, 1*l*.**
 96 THOMAS M. ROLLINSHAW, Kirkby Lonsdale, R. S. O.: the *Reserve Number* and *Highly Commended*.

CLASS 12.—Plymouth Rock Cockerel and Three Pullets.

- 111 CHRISTOPHER SAINTY, The Ham, Old Windsor: **FIRST PRIZE, 3*l*.**
 107 JOHN L. HOLDEN, Simonstone, Padiham, Burnley: **SECOND PRIZE, 2*l*.**
 102 SAMPSON BRATT, Ladderedge, Stoke-on-Trent: **THIRD PRIZE, 1*l*.**
 101 WILFRID BROUGHAM, Brougham, Penrith: the *Reserve Number* and *Highly Commended*.

CLASS 13.—Andalusian Cock and Three Hens.

- 117 MARGARET LEIGHTON, Bridge Street, Preston: **FIRST PRIZE, 3*l*.**
 115 THE REV. ERNEST R. O. BRIDGEMAN, Blymhill Rectory, Shifnal: **SECOND PRIZE, 2*l*.**
 114 HENRY ABBOT, Thuxton, Hingham, Norfolk: **THIRD PRIZE, 1*l*.**

CLASS 14.—Andalusian Cockerel and Three Pullets.

- 118 THE REV. ERNEST R. O. BRIDGEMAN: **FIRST PRIZE, 3*l*.**
 119 EDWIN MERRALL, Morton, Yorkshire: **SECOND PRIZE, 2*l*.**

CLASS 15.—Black Hamburg Cock and Three Hens.

- 120 SEYMOUR ASHWELL, Finmere Rectory, Buckingham: **FIRST PRIZE, 3*l*.**
 127 JOB RAWNSLEY, Langley Farm, Bingley, Yorkshire: **SECOND PRIZE, 2*l*.**
 125 THOMAS C. HEATH, Sneyd Green, Cobridge, Staffs: **THIRD PRIZE, 1*l*.**
 129 WILLIAM H. SHACKLETON, 27, Snake Hill Lane, Bradford, Yorkshire: the *Reserve Number* and *Highly Commended*.

CLASS 16.—Black Hamburg Cockerel and Three Pullets.

- 131 WILLIAM CANNAN, Norwood, Cross Hills, Yorkshire: FIRST PRIZE, 3*l*.
135 WILLIAM H. SMITH, Bradley, Kildwick, Yorkshire: SECOND PRIZE, 2*l*.
133 EDWIN MERRALL, Morton, Yorkshire: THIRD PRIZE, 1*l*.
130 JAMES BARNES, Burscough, Ormskirk: the *Reserve Number* and *Highly Commended*.

CLASS 17.—Hamburg Cock and Three Hens, any other variety.

- 137 WILLIAM CANNAN: FIRST PRIZE, 3*l*.
136 HENRY BELDON, Providence House, Baildon, Yorkshire: SECOND PRIZE, 2*l*.
140 JOB RAWNSLEY, Langley Farm, Bingley, Yorkshire: THIRD PRIZE, 1*l*. :
and (141) the *Reserve Number* and *Highly Commended*.

CLASS 18.—Hamburg Cockerel and Three Pullets, any other variety.

- 145 WILLIAM CANNAN: FIRST PRIZE, 3*l*.
147 HENRY PICKLES, Kayfield House, Easby, Leeds: SECOND PRIZE, 2*l*. :
and (146) THIRD PRIZE, 1*l*.
144 HENRY AND FRANCIS ALOOCK, Wall Bridge Farm, Leek, Staffs: the
Reserve Number and *Highly Commended*.

CLASS 19.—Leghorn Cock and Three Hens.

- 152 JOHN C. FRASER, 40, Mincing Lane, London: FIRST PRIZE, 3*l*.
148 THOMAS BOWES, Dipton, Lintz Green, Durham: SECOND PRIZE, 2*l*.
154 THOMAS MILNE, Oakfield House, Accrington, Lancashire: THIRD PRIZE, 1*l*.
158 PAUL SHAW, Shipley Glen, Saltaire, Leeds: the *Reserve Number* and
Highly Commended.

CLASS 20.—Leghorn Cockerel and Three Pullets.

- 159 ROBERT ANTHONY, Stamps Farm, Eastwood, Todmorden: FIRST
PRIZE, 3*l*.
168 PAUL SHAW: SECOND PRIZE, 2*l*.
160 HENRY C. BRIERLEY, 15, Sneinton Street, Nottingham: THIRD PRIZE, 1*l*.
165 JOSHUA ROBERTS, Kirkgate, Silsden, Leeds: the *Reserve Number* and
Highly Commended.

CLASS 21.—Polish Cock and Three Hens.

- 169 GEORGE C. ADKINS, The Lightwoods, Birmingham: FIRST PRIZE, 3*l*.
174 JOB RAWNSLEY, Langley Farm, Bingley, Yorkshire: SECOND PRIZE, 2*l*. :
and (175) THIRD PRIZE, 1*l*.
171 RICHARD C. HARRISON, Strand Street, Sandwich, Kent: the *Reserve
Number* and *Highly Commended*.

CLASS 22.—Polish Cockerel and Three Pullets.

- 178 JOB RAWNSLEY: FIRST PRIZE, 3*l*.
177 RICHARD C. HARRISON: SECOND PRIZE, 2*l*.

CLASS 23.—Black Spanish Cock and Three Hens.

- 181 JOHN POWELL, Hirst Mill, Saltaire, Yorkshire : **FIRST PRIZE, 3*l*.**
 179 WILFRID W. CROSTHWAIT, 10, Eden Mount, Stanwix, Carlisle : **SECOND PRIZE, 2*l*.**
 180 WILLIAM NEWBOLD, Casway Farm, Heapey, Chorley, Lancashire : **THIRD PRIZE, 1*l*.**
 182 ALBERT J. STEELE, Sutherland House, Hartwell, Longton, Staffs: the *Reserve Number and Highly Commended.*

CLASS 24.—Black Spanish Cockerel and Three Pullets.

- 187 JOHN POWELL : **FIRST PRIZE, 3*l*. : and (186) SECOND PRIZE, 2*l*.**
 183 WILLIAM R. BULL, Ouse Bank, Newport Pagnell, Bucks : **THIRD PRIZE, 1*l*.**

CLASS 25.—Coloured Dorking Cock and Three Hens.

- 196 BUTLER SMITH, The Grove, Cropwell Butler, Nottingham : **FIRST PRIZE, 3*l*.**
 190 THOMAS BRIDEN, Cononley, Leeds : **SECOND PRIZE, 2*l*.**
 193 JOHN HARRIS, Wellfield Road, Carmarthen : **THIRD PRIZE, 1*l*.**
 197 BUTLER SMITH : the *Reserve Number.*

CLASS 26.—Coloured Dorking Cockerel and Three Pullets.

- 203 BUTLER SMITH : **FIRST PRIZE, 3*l*. : and (202) SECOND PRIZE, 2*l*.**
 199 THOMAS BRIDEN : **THIRD PRIZE, 1*l*. : and (200) *Reserve Number and Highly Commended.***

CLASS 27.—Silver Grey Dorking, Cock and Three Hens.

- 206 WILLIAM ROE, JUN. : North Scarle Field, Newark : **FIRST PRIZE, 3*l*.**
 207 WILLIAM W. RUTTLIDGE, Storth End, Kendal, Westmoreland : **SECOND PRIZE, 2*l*.**
 208 MRS. T. WACHER, Woodnesboro', Sandwich, Kent : **THIRD PRIZE, 1*l*.**
 204 JOHN W. ANDREWS, Manor House, Hints, Tamworth, Staffs: the *Reserve Number and Highly Commended.*

CLASS 28.—Silver Grey Dorking, Cockerel and Three Pullets.

- 211 JAMES MOLLISON, JUN., Pavenham, Bedford : **FIRST PRIZE, 3*l*. : and (210) SECOND PRIZE, 2*l*.**
 213 JAMES ROBERTSON, Home Farm, Gordon Castle, Fochabers, N.B. : **THIRD PRIZE, 1*l*.**
 212 ARTHUR MAJOR, Horsemoor Green, Langley, Slough, Bucks: the *Reserve Number.*

CLASS 29.—Dorking Cock and Three Hens, any other variety.

- 215 ALFRED E. W. DARBY, Little Ness, Shrewsbury : **FIRST PRIZE, 3*l*.**
 218 JOHN L. PLAYFOOT, 85, High Street, Dorking : **SECOND PRIZE, 2*l*.**
 220 JOHN E. PILGRIM, The Outwoods, Hinckley, Leicestershire : **THIRD PRIZE, 1*l*.**
 216 MISS MARY FAIRHURST, Woodlands, Ormskirk, Lancashire : the *Reserve Number and Highly Commended.*

CLASS 30.—Dorking Cockerel and Three Pullets, any other variety.

- 221 ALFRED E. W. DARBY: FIRST PRIZE, 3*l*.
222 CHARLES A. GOSNELL, Bridge House, Feltham, Middlesex: SECOND PRIZE, 2*l*.
223 JOSEPH PETTIPHER, Woodway House, Banbury: THIRD PRIZE, 1*l*.

CLASS 31.—Crèveœur Cock and Three Hens.

- 224 JOHN AINSWORTH, High Bank, Darwen, Lancashire: FIRST PRIZE, 3*l*.
226 WILLIAM JACKSON, Bolton-le-Sands, Carnforth, Lancashire: SECOND PRIZE, 2*l*.: and (227) THIRD PRIZE, 1*l*.
225 J. T. CALVERT, Keighley, Yorkshire: the *Reserve Number* and *Highly Commended*.

CLASS 32.—Crèveœur Cockerel and Three Pullets.

- 229 J. T. CALVERT: FIRST PRIZE, 3*l*.
228 SARAH ANN AINSWORTH, High Bank, Darwen: SECOND PRIZE, 2*l*.

CLASS 33.—Black or Brown Red Game Cocks.

- 239 CAPTAIN HENRY HEATON, Worsley, Manchester: FIRST PRIZE, 3*l*.
231 CHARLES W. BRIERLEY, Rosedale, Tenbury, Worcestershire: SECOND PRIZE, 2*l*.
238 THOMAS HUDDLESTONE, 27, Aynam Road, Kendal, Westmoreland: THIRD PRIZE, 1*l*.
232 CHARLES W. BRIERLEY: the *Reserve Number* and *Highly Commended*.

CLASS 34.—Black or Brown Red Game Cockerels.

- 242 SIMON FIELDING, Trentham, Stoke-on-Trent: FIRST PRIZE, 3*l*.
246 CAPTAIN HENRY HEATON: SECOND PRIZE, 2*l*.
249 TOM MITCHELL, The Park, Eccleshill, Bradford, Yorkshire: THIRD PRIZE, 1*l*.
245 CAPTAIN HENRY HEATON: the *Reserve Number* and *Highly Commended*.

CLASS 35.—Three Black or Brown Red Game Hens.

- 252 CHARLES W. BRIERLEY: FIRST PRIZE, 3*l*.
257 CAPTAIN HENRY HEATON: SECOND PRIZE, 2*l*.
256 ROBERT H. HOLDEN, Park Street, Walsall, Staffs: THIRD PRIZE, 1*l*.
254 JAMES W. BROCKBANK, The Croft, Kirksanton, Carnforth: the *Reserve Number* and *Highly Commended*.

CLASS 36.—Three Black or Brown Red Game Pullets.

- 262 ROBERT HARKER, Manor House, Kirkby Stephen: FIRST PRIZE, 3*l*.
261 CAPTAIN HENRY HEATON: SECOND PRIZE, 2*l*.
258 SAMPSON BRATT, Ladderedge, Stoke-on-Trent: THIRD PRIZE, 1*l*.
263 FREDERICK D. ROBINSON: the *Reserve Number* and *Highly Commended*.

CLASS 37.—*Game Cocks, any other variety.*267 JAMES W. BROOKBANK : FIRST PRIZE, 3*l*.265 CHARLES W. BRIERLEY : SECOND PRIZE, 2*l*.; and (266) THIRD PRIZE, 1*l*.CLASS 38.—*Game Cockerels, any other variety.*269 JOSHUA ROBERTS, Kirkgate, Silsden, Leeds : SECOND PRIZE 2*l*.CLASS 39.—*Three Game Hens, any other variety.*271 CHARLES W. BRIERLEY : FIRST PRIZE, 3*l*.; and (272) SECOND PRIZE, 2*l*.273 JAMES W. BROCKBANK : THIRD PRIZE, 1*l*.CLASS 40.—*Three Game Pullets, any other variety.*277 JOSHUA ROBERTS : FIRST PRIZE, 3*l*.275 CAPTAIN HENRY HEATON : SECOND PRIZE, 2*l*.; and (276) THIRD PRIZE, 1*l*.

DUCKS.

CLASS 41.—*Aylesbury Drake and Two Ducks.*281 WILLIAM WESTON, 31, Mount Street, Aylesbury : FIRST PRIZE, 3*l*.279 ROBERT R. FOWLER, Prebendal Farms, Aylesbury : SECOND PRIZE, 2*l*.280 EDWARD SNELL, Ketton, Stamford : THIRD PRIZE, 1*l*.CLASS 42.—*Young Aylesbury Drake and Two Ducklings.*283 ROBERT R. FOWLER : FIRST PRIZE, 3*l*.284 WILLIAM WESTON : SECOND PRIZE, 2*l*.282 JOHN DAVIES, Howeth Farm, Garstang, Lancashire : THIRD PRIZE, 1*l*.CLASS 43.—*Rouen Drake and Two Ducks.*292 THOMAS WAKEFIELD, High Street, Golborne, Newton-le-Willows : FIRST PRIZE, 3*l*.291 HENRY WIDDOP, Daisy Hill, Rawdon, Leeds : SECOND PRIZE, 2*l*.286 JOHN W. FAWCETT, Bula House, Old Hutton, Kendal : THIRD PRIZE, 1*l*.

288 MITCHELL BROTHERS, Springfield Farm, Hall Green, Birmingham : the Reserve Number and Highly Commended.

CLASS 44.—*Young Rouen Drake and Two Ducklings.*296 HENRY WIDDOP : FIRST PRIZE, 3*l*.293 DANIEL BRAGG, Southwaite Hall, Carlisle : SECOND PRIZE, 2*l*.299 THOMAS WAKEFIELD : THIRD PRIZE, 1*l*.

295 EDWARD KENDRICK, JUN., Weeford House, Lichfield : the Reserve Number and Highly Commended.

GEESE.

CLASS 45.—*Gander and Two Geese.*

- 310 ROBERT WINKLEY, 76, Clement Street, Accrington, Lancashire: **FIRST PRIZE, 3*l*.**
307 EDWARD SNELL, Ketton, Stamford: **SECOND PRIZE, 2*l*.**
308 J. AND H. SMITH, Causeway House, Clitheroe: **THIRD PRIZE, 1*l*.**
303 ROBERT R. FOWLER: the *Reserve Number* and *Highly Commended*.

CLASS 46.—*Young Gander and Two Goslings.*

- 314 SAMUEL H. STOTT, The Lindens, Fulwood, Preston: **FIRST PRIZE, 3*l*.**
311 DANIEL BRAGG: **SECOND PRIZE, 2*l*.**
313 ROBERT REICH, Lords Plain, Milnthorpe, Westmoreland: **THIRD PRIZE, 1*l*.**
315 JOHN J. STOTT, Fulwood, Preston: the *Reserve Number* and *Highly Commended*.

TURKEYS.

CLASS 47.—*Black or Bronze, Cock and Two Hens.*

- 317 EDWARD KENDRICK, JUN.: **FIRST PRIZE, 3*l*.**
318 THE REV. NICHOLAS J. RIDLEY, Hollington House, Newbury: **SECOND PRIZE, 2*l*.**
316 ESTHER M. HALL, Shaw Bridge, Clitheroe: **THIRD PRIZE, 1*l*.**
319 MRS. T. SHENTON, The Home Farm, Hints, Tamworth: the *Reserve Number* and *Highly Commended*.

CLASS 48.—*Black or Bronze, Cockerel and Two Poults.*

- 322 EDWARD KENDRICK, JUN.: **FIRST PRIZE, 3*l*.; and (321) SECOND PRIZE, 2*l*.**
(No awards in CLASSES 49 and 50.)

IMPLEMENTS, ETC.

- L. R. KNAPP AND Co., Thames Valley Iron Works, Clanfield, Faringdon, Berks: **PRIZE of 2*l*.** for their Set of Two-horse Whippetrees (Article 1660).
RANSOMES, SIMS, AND JEFFERIES, Limited, The Orwell Works, Ipswich: **PRIZE of 2*l*.** for their Set of Three-horse Whippetrees (Article 4840).
VIPAN AND HEADLY, Church Gate Iron Works, Leicester: **PRIZE of 2*l*.** for their Set of Four-horse Whippetrees (Article 325).
THOMAS BRADFORD AND Co., Crescent Iron Works, Salford: **PRIZE of 5*l*.** for their Package suitable to convey fresh Butter by Rail (Article 3421).
THOMAS FAWCETT AND Co., 191, Coltman Street, Hull: **extra PRIZE, 1*l*.**, for their Package suitable to convey fresh Butter by Rail (Article 5063).

SILVER MEDALS.

- W. RAINFORTH AND SONS, Britannia Works, Lincoln, for their Flat Adjustable Corn Screen (Article 2402).
 HATHORN, DAVEY, AND Co., Sun Foundry, Leeds, for their Domestic Safety Engine (Article 3939).
 R. HORNSBY AND SONS, Limited, Spittlegate Iron Works, Grantham, for their Plough for taking off the top Spit for draining (Article 4130).
 ROBERT MAYNARD, Whittlesford Works, Cambridge, for his Automatic Feeder, attached to Chaff Cutter (Article 4590).

FARM PRIZES, ETC.†

CLASS 1.—*For the best managed Arable Farm of 100 acres and upwards in extent, with at least two-thirds of its area under rotation of cropping.*

- 1 W. GORE ASHTON, Roby Farm, Liverpool: **FIRST PRIZE, 50*l*.**
 14 CHARLES SHEERWIN, Ashley Hall, Altrincham: **SECOND PRIZE, 25*l*.**
 2 JAMES CALLWOOD, of Chelford, Crewe: the **RESERVE NUMBER** and **SPECIAL PRIZE.**

CLASS 2.—*For the best managed Arable Farm above 30 and under 100 acres under the same conditions.*

- 21 JOHN CROPPER, Moss Side, Maghull, Liverpool: **FIRST PRIZE, 30*l*.**
 19 RICHARD BRADY, Banks, Southport: **SECOND PRIZE, 15*l*.**

Recommendations for Certificates by the Judges in Classes 1 and 2.

The Judges are further agreed that GEORGE MOSS, farm servant to Samuel Rosbotham, Stanley Farm, Bickerstaff, Ormskirk, is thoroughly deserving of the encouragement of the Society's Certificate, in consideration of the long term of good service (29 years) that he has rendered to his employer, who speaks highly of his general capacity, his trustworthiness, and also the respectability with which he has brought up a large family.

CLASS 3.—*For the best managed Dairy Farm of 100 acres and upwards, where the management and cultivation are most successfully directed to the production of Milk, Butter, or Cheese.*

- 27 JOHN LEA, Stapleford Hall, Tarvin, Chester: **FIRST PRIZE, 50*l*.**
 29 THOMAS PARTON, Charlton, Nantwich: **SECOND PRIZE, 25*l*.**
 25 THOMAS FEARNALL, Royley, Bangor, Wrexham: **RESERVE NUMBER** and **HIGHLY COMMENDED.**

CLASS 4.—*For the best managed Dairy Farm, above 30 and under 100 acres, as in Class 3.*

- 34 EDWARD G. HOTHERSALL, Lightfoot House, Broughton, Preston: **FIRST PRIZE, 30*l*.**

† Offered by the Preston Local Committee, the Right Hon. the Earl of Derby, K.G., Mrs. Clifton of Lytham Hall, and the Council of the Royal Agricultural Society of England

32 JONATHAN FOWLER, Free Hall Farm, Ashton-on-Ribble, near Preston : SECOND PRIZE, 15*l*.

CLASS 5.—*For the best managed Stock Breeding Farm of 100 acres and upwards, where the management is principally and most successfully directed to the breeding and rearing of Farm Stock, Cattle, Sheep, Horses, or Pigs.*

39 GEORGE ASHBURNER, Low Hall, Kirkby-in-Furness, Carnforth : FIRST PRIZE, 50*l*.

41 JAMES TUNSTALL, St. Michael's-on-Wyre, Garstang : SECOND PRIZE, 25*l*.

CLASS 6.—*For the best managed Stock Breeding Farm, above 30 and under 100 acres, as in Class 5.*

42 JOHN COTTAM, Well House, Scotforth, Lancaster : FIRST PRIZE, 30*l*.

CLASS 7.—*For the best managed Farm of not more than 40 acres, where the principal part of the labour is contributed by the Farmer's own family.*

44 WILLIAM LOXHAM, Leyland, Preston : FIRST PRIZE, 20*l*.

45 MARGARET PARK, Copper Farm, Little Marton, Blackpool : SECOND PRIZE, 10*l*.

43 JOSEPH GIBBINS, Culcheth, Warrington : THIRD PRIZE, 5*l*.

Recommendations for Certificates by the Judges in Classes 3 to 7.

The Judges recommend that the highest mark of approval at the disposal of the Council be awarded to the ELDEST DAUGHTER of Mr. Thomas Fearnall, now at home, on whom (since the death of her mother) the care and responsibility of this large Dairy, young family and household, have almost entirely rested.

The Judges also recommend Certificates for distinguished merit in the discharge of their duties on the Farms inspected to WILLIAM VERNON, in the employment of Mr. John Lea, of Stapleford Hall, who has been herdsman and principal labourer on the Stapleford Hall Farm, in the occupation of Mr. John Lea and his predecessor, the late Mr. W. Patin, for nearly half a century : to THOMAS SPROSDON, 24 years herdsman to the farm of Mr. Thomas Parton, at Chorlton, Nantwich ; to THOMAS PEAK, 18 years principal labourer on the farm of Mr. Thomas Fearnall, Royley, near Wrexham ; to JOSEPH LLOYD, in the employment of Mr. Cyrus Lea, of Duddon Hall, Tarporley.

PRACTICAL EXAMINATION OF BUTTERMAKERS.

Certificates of Efficiency have been awarded as follows :—

MARY HIRD WARD, Halsnead Park Farm, Prescot, Lancashire : FIRST PRIZE, 5*l*.

WALTER THOMAS TOMLINSON, 22, Hough Lane, Broughton, Manchester : SECOND PRIZE, 3*l*.

WILLIAM HENRY KNIGHT, 1, Russel Villa, Russel Street, Gloucester : THIRD PRIZE, 2*l*.

MARY JANE HAILWOOD, 119, Lower Broughton Road, Broughton, Manchester : COMMENDED.

AGRICULTURAL EDUCATION.

Examination Papers, 1885.

EXAMINATION IN AGRICULTURE.

MAXIMUM NUMBER OF MARKS, 100. PASS NUMBER, 50.

Tuesday, May 12th, from 10 a.m. till 1 p.m.

1. The farm is situated in a Midland county 120 miles north of London; the soil is a good loam varying in consistency, and from 1 to 3 feet in depth, resting on a layer of gravel. The area is 300 acres, 100 acres of which is tillage, 40 acres feeding land, and 160 acres good sound dairy and stock land. The whole is enclosed in a ring fence. The homestead is centrally situated, with all the modern requirements for the successful management of a large head of stock. The distance from the homestead to the nearest railway station is $1\frac{1}{2}$ miles. The arable portion lies to the south of the homestead, and is divided into eight enclosures of from 10 to 15 acres each. The rent is 600*l.* a year. Under present agricultural conditions, what is the best system of management to adopt?

2. What number of cows or three-year-old heifers will the 40 acres of grass land fatten off between the 1st of May and the 1st of October, without the aid of artificial food?

And how many if they receive an allowance of 4 lbs. per head per diem of decorticated Cotton-cake?

3. Assuming that the 160 acres of secondary grass land and the chief part of the produce of the arable area is utilised in keeping a herd of dairy cows and raising young stock, what number of cows, rearing calves, yearlings, and two-year-olds, would the farm keep?

4. What breed of dairy cattle are best adapted for producing milk and for stock-raising?

5. What means would you adopt to improve the offspring and develop their milking capabilities?

6. Name a few of the best milking strains of pure bred Shorthorns.

7. State shortly the chief points and leading characteristics of a young Shorthorn bull suited for use on a herd of ordinary dairy cows.

8. The surplus steers and heifers are fed off at $2\frac{1}{2}$ years old along with the draught cows on the grass land; beyond these, what purchased stock will be necessary, and of what age and sex?

9. Should the draught cows be in a lean or a forward state of

condition when turned out to grass, and at what period of the year are they likely to command the highest price per lb. in the market?

10. What is the best daily ration during the winter months for a cow in full milk, for a yearling, and for a two-year-old, in preparation for fattening off on grass during the following summer?

11. What extent of land should be mown on this farm, and what weight per acre would you consider a fair crop?

12. Should the store pastures receive any artificial assistance; if so, what is the best and most economical dressing?

13. For what description of stock are covered yards most suitable? Explain why they are so.

14. The chief object is to keep the maximum number of stock at a minimum cost. What system of cropping the arable land will best effect this purpose?

15. State the average quantity of straw the cereal crops will produce.

16. How should the land be prepared for a root crop?

17. State the best quantity of farm-yard and artificial manures for cabbage, mangolds and swedes, respectively, and the dates of their application.

18. State the number of the regular staff of men and boys required and the yearly cost of labour per acre.

19. What number of horses are required to work the land, and what will be the yearly cost of the keep of each horse for food only; home-grown produce to be charged at market price?

20. What is the best and most economical system of feeding farm horses from the 1st of October to the 1st of May? State the quantities required of the different varieties of food per day. State also the best system of feeding from the 1st of May to the 1st of October, with the requisite quantities of each per diem.

EXAMINATION IN CHEMISTRY.

MAXIMUM NUMBER OF MARKS, 200. PASS NUMBER, 100.

I. AGRICULTURAL CHEMISTRY.

Wednesday, May 18th, from 2 p.m. till 5 p.m.

1. Describe the manufacture of superphosphate, giving the chemical changes which take place in the process.

Taking into account the phosphates alone, would you consider these more or less valuable when derived from bone or from purely mineral sources? State your reasons.

2. What products obtained in the manufacture and purification of

coal gas are available for use in agriculture? How are these severally obtained, purified if necessary, subsequently used, and for what purposes?

3. What manurial ingredients of value does raw sewage contain? Mention any process by which sewage can be purified. What are the chief difficulties in the way of its utilisation for agricultural purposes?

4. Describe the chemical method by which the amount of Nitrogen present in manures, feeding stuffs, &c., is generally determined in the laboratory.

5. What are the chemical changes which take place

- (a) when limestone is burnt,
- (b) when burnt lime is exposed to the atmosphere,
- (c) when bones are converted into bone-ash,
- (d) when farm-yard manure is kept some time,
- (e) when guano is dissolved?

6. To what constituents do the following materials owe their value?

- (a) as Foods—Linseed-cake, Cotton-cake (decorticated and undecorticated)—Maize-meal—Pea-meal—Rice-meal.
- (b) as Manures—Decorticated Cotton-cake, Rape-cake, Shoddy, Soot, Fish Guano, Nitrate of Soda, Kainit.

Give approximately the percentages of the valuable constituents in each.

7. From what causes may a natural supply of water be, or subsequently become, unfit or unsuitable for ordinary domestic purposes? When supplied through a system of pipes, what further sources of danger may arise, and how can they be guarded against?

8. In respect of the advantages and disadvantages of a bare fallow, what are the chemical changes which take place in soils during such a fallow, and what circumstances affect the value of these changes?

II. GENERAL CHEMISTRY.

Wednesday, May 13th, from 10 a.m. till 1 p.m.

1. Describe the chief properties of nitrogen. Explain how it may be obtained from atmospheric air. How can you test whether an organic substance contains nitrogen?

2. Give an account of the composition and properties of the substance produced when sulphur is burnt in air.

3. Compare the weights of nitrogen in equal weights of nitrate of soda and sulphate of ammonia ($N : O : S = 14 : 16 : 32$).

4. What sort of substances can be separated from water by (1) filtration (2) distillation? How are the properties of water affected by carbonic acid in solution?

5. Explain what is meant by the diffusion of gases. How is it shown that gases do not all diffuse at the same rate? Find the relative rates of diffusion in the atmosphere of carbonic acid gas and aqueous vapour.

6. What is galvanized iron? Explain the advantages of so treating iron.

7. What are the distinguishing characters of compounds of manganese? Mention points of resemblance of such compounds to those of iron. What is potassium permanganate and what are its properties?

8. State the general constitution of animal oils, and how they differ from mineral oils and oil of turpentine. What is the cause of *drying* of oils?

9. Explain the relations between starch, sucrose, glucose and lactose. What are the conditions under which lactic acid is formed?

EXAMINATION IN MENSURATION AND SURVEYING.

MAXIMUM NUMBER OF MARKS, 100. PASS NUMBER, 50.

Thursday, May 14th, from 2 p.m. till 5 p.m.

1. State three rules for finding the area of a triangle from different data.

The three sides of a triangle are $AB = 751$ feet, $BC = 564$ feet, $CA = 623$ feet; calculate its area, and the length of the perpendicular let fall from A upon BC .

2. State the rules for finding the area and circumference of a circle, when the diameter is known.

How many cubic yards of earth have to be moved in sinking a well 5 feet in diameter, and 80 feet deep? Estimate the number of bricks required to line the well, assuming that each brick is 9 inches $\times$ 4½ inches $\times$ 3 inches, and that the bricks are laid with the 3-inch edge vertical, and the 4½-inch edge at right angles to the side of the well.

3. A piece of timber is 40 feet long; the circumference at one end is 150 inches, that at the other end is 50 inches; calculate the number of cubic feet in it, assuming its form to be that of a frustum of a cone. Estimate its weight, assuming its specific gravity to be 0.8.

4. Define a prismoid, and state the rule for finding its volume.

Stones are heaped against a vertical bank to a height of 10 feet; the heap is on level ground, and its base is a rectangle 100 feet long in a direction parallel to the bank, and 20 feet at right angles to

the bank; the slopes of the inclined faces are 1 vertical to 1 horizontal; draw to scale a plan of the heap, and find its volume.

5. AB is a line, marked on a level piece of ground by two pegs A and B ; P is a third peg, not in the line AB ; explain a method by which you could drive a fourth peg Q into the ground, so that the line PQ should be parallel to AB , supposing that you are provided with nothing more than a measuring tape, pegs, and a mallet.

6. What is a contour or contour-line?

On a piece of an ordnance map a stream is denoted by a line, which we will call AB ; a contour line crosses it at a point C between A and B , and runs along not far from the stream and on both sides of it, from C to points near B . Would you infer from this that the stream flows from A to B , or would you infer that it flows from B to A ? Give a reason for the inference which you draw.

7. Draw to a scale of 500 feet to the inch a quadrilateral $ABCD$, having given $AB = 2520$ feet, $BC = 1950$ feet, $CD = 1555$ feet, $DA = 2745$ feet, and the diagonal $DB = 3155$ feet, and find its area from the diagram.

8. In the last question suppose the diagram to represent the plan of a piece of ground, and that AB on the ground is level, that the line represented in plan by BC has a slope upward from B of 1 vertical to 15 horizontal, and that the line represented in plan by CD has a slope downward from C of 1 vertical to 20 horizontal; find the slopes of the lines (assuming that they have a uniform slope) whose plans are AD and the diagonal AC .

9. Calculate, as accurately as your tables allow, the number of degrees, minutes, and seconds in the angle of inclination of a line to the horizon which has a slope of 1 vertical to 15 horizontal.

10. B and C are two points not visible from each other, whose distances from a third point A are known, viz., $AB = 743$ yards, $AC = 857$ yards; the angle BAC is measured and found to equal $105^\circ 18'$; calculate the distance BC .

EXAMINATION IN MECHANICS AND NATURAL PHILOSOPHY.

MAXIMUM NUMBER OF MARKS, 200. PASS NUMBER, 100.

Thursday, May 14th, from 10 a.m. till 1 p.m.

1. If a body is suspended by one point, without other support, and is allowed to come to rest, what will be the position of the centre of gravity? In that position will the body be in stable or unstable equilibrium, and why?

2. A piece of wire of uniform density is bent so as to form three sides of a square, where is its centre of gravity? If the wire in this

form were hung up by one end, show in a diagram the position in which it would come to rest.

3. If a body rests on an inclined plane, supported by a force acting parallel to the incline, explain how to find the relation between the force, the pressure on the plane, and the weight of the body. If the length of the base is 12 feet and the height of the plane 5 feet, what force acting along the incline will support a body weighing 780 lbs., and what pressure will there be on the plane?

4. Two equal pulleys are firmly fastened to a fixed beam, so that their centres are in a horizontal line; a fine thread passes over both, and has a weight of 3 lbs. fastened to each of its hanging ends. If a weight of 1 lb. is hung on to the middle of the horizontal part of the thread, and allowed to descend gently, in what position will it come to rest?

5. Define a foot-pound and a horse-power.

An engine of 5-horse-power works a pumping apparatus which is found to deliver a stream of water with a constant velocity of 3 miles an hour, and a cross section of one-fifth of a square foot, at a height of 40 feet above the reservoir from which the water is taken. What part of the power of the engine is employed in lifting the water, and what part in overcoming friction, &c.?

6. A body whose mass is 20 lbs. slides along a horizontal plane, the co-efficient of friction between which and the body is one-eighth. What resistance does friction offer to the motion? What velocity does the body lose in every second? If the body has at any instant a velocity of 30 miles an hour, in how many seconds, from that instant, will it come to rest?

7. If a body is partly immersed in water, what is the magnitude and direction of the resultant of the fluid pressures on it?

If one end of a floating rod is lifted out of water by means of a thread fastened to it, so that the rod floats in an inclined position, partly in and partly out of water, why will the position of the rod be such that the thread will be vertical?

8. State Boyle's Law for the pressure of gases, and describe the experiment by which it was established.

A room is 50 ft. long, 30 ft. wide, and 20 ft. high; suppose that at any instant the barometer stand at 29.5 in., and that shortly after (without any change of temperature) it rises half an inch; how many cubic feet of air (at 30 in.) have come into the room?

9. What is the fly-wheel of a steam engine, and for what purpose is it used?

If its mean radius is 10 ft., and its weight 20 tons, what is its accumulated work (or vis viva, or kinetic energy) in foot-pounds, when it makes 15 revolutions a minute? ($g = 32$). State how the "mean radius" would have to be determined for an exact answer, to the above question in the case of a fly-wheel of given dimensions.

EXAMINATION IN BOOK-KEEPING.**MAXIMUM NUMBER OF MARKS, 200. PASS NUMBER, 100.***Friday, May 15th, from 10 a.m. till 1 p.m.*

On the 1st January, 1883, the affairs of John Griffiths stood as follows:—

ASSETS.

			£	s.	d.	£	s.	d.
Cash at Bankers	..	..	553	18	6			
Bills Receivable—								
Due 25th January, 1883	250	0	0					
" " July, 1883 ..	250	0	0					
" " January, 1884	250	0	0					
						750	0	0
Freehold Farm at Basingstoke, with								
Buildings, Timber, &c., valued at ..	19,100	0	0					
Live Stock	3500	0	0					
Plant, Machinery and Tools	2609	10	0					
Hay, Straw and Corn	2150	15	6					
Growing Crops	670	15	6					
Due from Jackson for Timber cut in								
December, 1882	900	0	0					
						30,234	19	6

LIABILITIES.

M'Leod for Fencing	150	3	6					
Robey & Son for Steam Plough	1300	0	0					
Sutton for Seeds and Cake	250	0	0					
Newell & Son Mortgage on Farm at								
4 per cent.	5000	0	0					
Ditto for 6 months' Interest, due 29th								
December, 1882, less Income Tax at 6d.	97	10	0					
						6797	13	6

Open a Ledger for the above Accounts.

Journalize the following imaginary transactions. Post them in the Ledger and make out a "Profit and Loss Account" for the Year 1883, and a "Balance-sheet" as on the 31st December, 1883.

NOTE.—Sales of timber and outlay on farm buildings are "Capital Items," and increase or reduce the value of the Freehold Farm.

He pays wages during the year 1500*l*.

He accepts a contract from Stoner to build a new barn and four new cottages for 1200*l*., and pays Stoner 800*l*. on account.

He cuts timber to the value of 600*l*., which he sells to Jackson & Co., who pay him by cheque 1500*l*.

He spends 800*l.* for his personal expenses.

He pays 30*l.* Insurance.

He sells to John Sharp, Corn Dealer, Cereal Produce 960*l.*, Hay 600*l.*, and is paid in cash (1482*l.*), allowing 5 per cent. discount.

He sells live-stock to Murdoch for 2950*l.* and is paid 950*l.* cash, and receives two bills for 1000*l.* each ; one due in October, 1883, and one due in January, 1884.

He buys beasts for grazing of Williams for 1350*l.*, for which he pays in cash.

He purchases seeds, cake and guano from Sutton for 350*l.* and pays him 540*l.*, being allowed 10 per cent. discount.

He gives Robey & Co. a bill for 1300*l.*, due August 10th, 1883.

He pays M'Leod 150*l.* 3*s.* 6*d.* for the fencing.

He sells milk and butter to Hancock for 350*l.* and receives 300*l.* cash. Then Hancock fails and his estate is estimated to realise only 5*s.* in the *l.*, so 37*l.* 10*s.* is written off as a bad debt.

He pays the interest on his mortgage (less income tax at 6*d.*) up to 29th December, 1883, by two cheques, 195*l.* and 97*l.* 10*s.*

He writes 5 per cent. off plant and machinery for depreciation.

He spends 200*l.* cash for ordinary repairs.

At the end of the year his live stock is valued as follows :—
9 horses at 50*l.* each, 60 cows at 20*l.* each, 200 sheep at 3*l.* each, hay, corn and straw 3100*l.*, growing crops 750*l.*

EXAMINATION IN GEOLOGY.

MAXIMUM NUMBER OF MARKS, 100. PASS NUMBER, 50.

Friday, May 15th, from 2 p.m. till 5 p.m.

1. What is Gravel? Describe in detail any examples which you know, with the circumstances of their origin, places of occurrence, and the nature of the surface of the ground composed of them, whether cultivated or otherwise.

2. Mention and describe the chief Clay districts of England. What do they produce in the natural, and in the cultivated state, respectively?

3. What are *Shale*, *Slate*, and *Schist*? Describe their characteristic differences; and explain the causes that have produced these differences.

4. Give some account of the processes concerned in the disintegration and decomposition of Granite, and of the ultimate disposition of the resultant materials.

5. Indicate by description, or on a sketch-map, the range and distribution of the Silurian, Carboniferous, and Cretaceous Limestones respectively, in the British Isles; and give some notes on the differences of character and constitution of the several limestones you mention.

6. In traversing a country, you meet with wide tracts characterised respectively by heather, elms, pine-trees, beech, grass, whortleberry, equisetum, yew trees, oaks, ferns,—what kind of ground would you expect to find existing with each? Mention any districts in the British Isles so conditioned.

7. Describe the nature and origin of the materials of which Bricks and Tiles are made, respectively. Under what conditions are these materials found at places within your knowledge?

8. Indicate by description, or on a sketch-map, where Granite, Gneiss, Mica-schist, and Slate are met with in the British Islands.

9. Write an account of the origin and mode of occurrence of Natural Springs; and state under what conditions water may be expected to be found in common Wells and artesian Borings. Give diagrams in your answer.

10. Why are Fossils of great use in Geology? Write what you know of Archæopteryx, Beryx, Ceratites, Discina, Estheria, Favosites, Gryphea, Hybodus, Ichthyosaurus, Lingula, Megaceros, Nautilus.

11. Enumerate and describe the most important Minerals that enter into the composition of the Igneous and the Sedimentary Rocks, respectively.

12. Describe the Specimens on the Table.

EXAMINATION IN BOTANY.

[It is expected that Eight Questions at least will be answered.]

MAXIMUM NUMBER OF MARKS, 100. PASS NUMBER, 50.

Saturday, May 16th, from 10 a.m. till 1 p.m.

1. What is the function of the epidermis? What plants are without epidermis, and what part or parts of flowering plants are not covered with epidermis?

2. Explain the phenomena of nutrition in a unicellular alga.

3. Explain the conditions necessary for the germination of a seed.

4. What changes take place in starch stored in the seed before it can be assimilated by the germinating plant?

5. Specify the different parts of plants used for storing food, and give examples.

6. What are the differences between an epiphyte, a saprophyte, and a parasite?

7. Explain the fertilisation of the ovule in angiosperms and in gymnosperms.

8. State shortly the structure and method of growth of dodder, the plants which it attacks, and the natural order to which it belongs. What steps would you take to eradicate it from a field?

9. Which of the following grasses would you employ in laying down permanent pasture:—*Dactylis glomerata*, *Festuca pratensis*, *Holcus lanatus*, *Lolium perenne*, *Poa trivialis*, *Molinia coerulea*, *Phleum pratense*, and *Alopecurus pratensis*? Give the reasons for your selection.

10. Give the technical names and natural orders of the yew, the apple, the oak, the mountain ash, the beech, and the lime.

11. Name and describe in technical language the plants marked A, B, and C.

EXAMINATION IN ANATOMY AND ANIMAL PHYSIOLOGY.

MAXIMUM NUMBER OF MARKS, 100. PASS NUMBER, 50.

Saturday, May 16th, from 2 p.m. till 4 p.m.

1. State the number of Vertebrae existing in the horse and ox, and say how you would distinguish a rib of the horse from that of the ox?

2. Name the bones of the fore-leg of the ox from the knee downwards, and point out the comparative differences which exist between each and the corresponding bone in the horse.

3. Name the teeth which exist in the horse, but not in the ox, pointing out their relative position in the mouth and their number.

Describe the dentition of the ox from and after six months of age until all the teeth, incisors and molars, become permanent.

4. Give the number and names of the so-called nerves of special sense and say to which organ each is distributed.

5. Name the structures through which a needle would pass if made to penetrate the eye from the front to the back part; say also by what means the amount of light entering the organ is regulated.

6. Describe the period of utero-gestation in the mare, cow, ewe, and pig, and say by what means the birth of a foetus is effected, and in what respect these differ from ordinary muscular contractions.

7. Describe the circulation of the blood in the foetal calf, and give the reasons for the existence of certain vessels—naming each—which in the foetus cease to carry blood after birth.

8. Name the membranes which surround the foetus *in utero*, and describe the difference which exists between the outermost placed one in the cow and mare.

MEMORANDA.

ADDRESS OF LETTERS.—The Society's office being situated in the postal district designated by the letter W, Members, in their correspondence with the Secretary, are requested to subjoin that letter to the usual address.

GENERAL MEETING in London, December, 1885.

GENERAL MEETING in London, May 22nd, 1886, at 12 o'clock.

MEETING at Norwich, July, 1886.

MONTHLY COUNCIL (for transaction of business), at 12 o'clock on the first Wednesday in every month, excepting January, September, and October: open only to Members of Council and Governors of the Society.

ADJOURNMENTS.—The Council adjourn over Passion and Easter weeks, when those weeks do not include the first Wednesday of the month; from the first Wednesday in August to the first Wednesday in November; and from the first Wednesday in December to the first Wednesday in February.

OFFICE HOURS.—10 to 4. On Saturdays, 10 to 2.

DISEASES OF CATTLE, SHEEP, AND PIGS.—Members have the privilege of applying to the Veterinary Committee of the Society, and of sending animals to the Royal Veterinary College, Camden Town, N.W.—(A statement of these privileges will be found on page cxiv in this Appendix.)

CHEMICAL ANALYSIS.—The privileges of Chemical Analysis enjoyed by Members of the Society will be found stated in this Appendix (page cxl).

BOTANICAL AND ENTOMOLOGICAL PRIVILEGES.—The Botanical and Entomological Privileges enjoyed by Members of the Society will be found stated in this Appendix (page cxvi).

SUBSCRIPTIONS.—1. **ANNUAL.**—The subscription of a Governor is £8, and that of a Member £1, due in advance on the 1st of January of each year, and becoming in arrear if unpaid by the 1st of June. 2. **For Life.**—Governors may compound for their subscription for future years by paying at once the sum of £80, and Members by paying £10. Governors and Members who have paid their annual subscription for 20 years or upwards, and whose subscriptions are not in arrear, may compound for future annual subscriptions, that of the current year inclusive, by a single payment of £26 for a Governor, and £6 for a Member.

PAYMENTS.—Subscriptions may be paid to the Secretary, in the most direct and satisfactory manner, either at the Office of the Society, No. 12, Hanover Square, London, W., or by means of post-office orders, to be obtained at any of the principal post-offices throughout the kingdom, and made payable to him at the Vere Street Office, London, W.; but any cheque on a banker's or any other house of business in London will be equally available, if made payable on demand. In obtaining post-office orders care should be taken to give the postmaster the correct initials and surname of the Secretary of the Society (H. M. Jenkins), otherwise the payment will be refused to him at the post-office on which such order has been obtained; and when remitting the money-orders it should be stated by whom, and on whose account, they are sent. Cheques should be made payable as drafts on demand (not as bills only payable after eight or a certain number of days after date), and should be drawn on a London (not on a local country) banker. When payment is made to the London and Westminster Bank, St. James's Square Branch, as the bankers of the Society, it will be desirable that the Secretary should be advised by letter of such payment, in order that the entry in the banker's book may be at once identified, and the amount posted to the credit of the proper party. No coin can be remitted by post, unless the letter be registered.

NEW MEMBERS.—Every candidate for admission into the Society must be proposed by a Member; the proposer to specify in writing the full name, usual place of residence, and post-town, of the candidate, either at a Council meeting, or by letter addressed to the Secretary. Forms of Proposal may be obtained on application to the Secretary.

* * * Members may obtain on application to the Secretary copies of an Abstract of the Charter and Bye-laws, of a Statement of the General Objects, &c., of the Society, of Chemical, Botanical and Veterinary Privileges, and of other printed papers connected with special departments of the Society's business.

Governors' and Members' Privileges of Chemical Analysis.

(Applicable only to the case of Persons who are not commercially engaged in the manufacture or sale of any substance sent for Analysis.)

THE Council have fixed the following rates of Charges for Analysis to be made by the Consulting Chemist for the *bond-fide* and sole use of Members of the Society; who, to avoid all unnecessary correspondence, are particularly requested, when applying to him, to mention the kind of analysis they require, and to quote its number in the subjoined schedule. Governors of the Society are also allowed to send to the Society's Laboratory for analysis, at the following scale of fees, any manures and feeding stuffs which are to be used by their outgoing tenants. The charge for analysis, together with the cost of the carriage of the specimens (if any), must be paid to the Consulting Chemist at the time of application:

No.		
1.	An opinion of the genuineness of bone-dust or oil-cake (each sample)	2s. 6d.
2.	An estimate of the value (relatively to the average samples in the market) of sulphate and muriate of ammonia and of the nitrates of potash and soda	5s.
3.	An analysis of guano; showing the proportion of moisture, organic matter, sand, phosphate of lime, alkaline salts and ammonia, and an estimate of its value, provided the selling price of the article to be analysed be sent with it	10s.
4.	An analysis of mineral superphosphate of lime for soluble phosphates only, and an estimate of its value, provided the selling price of the article to be analysed be sent with it	5s.
5.	An analysis of superphosphate of lime, showing the proportions of moisture, organic matter, sand, soluble and insoluble phosphates, sulphate of lime, and ammonia, and an estimate of its value, provided the selling price of the article to be analysed be sent with it	10s.
6.	An analysis, showing the value of bone-dust or any other ordinary artificial manure, provided the selling price of the manure to be analysed be sent with it	10s.
7.	An analysis of limestone, showing the proportion of lime	7s. 6d.
8.	An analysis of limestone, showing the proportion of lime and magnesia	10s.
9.	An analysis of limestone or marls, showing the proportion of carbonate, phosphate, and sulphate of lime and magnesia, with sand and clay	10s.
10.	Partial analysis of a soil, including determinations of clay, sand, organic matter, and carbonate of lime	10s.
11.	Complete analysis of a soil	£3
12.	An analysis of oil-cake or other substance used for feeding purposes, showing the proportion of moisture, oil, mineral matter, albuminous matter, and woody fibre, as well as of starch, gum, and sugar in the aggregate; and an opinion of its feeding and fattening or milk-producing properties	10s.
13.	Analysis of any vegetable product	10s.
14.	Analysis of animal products, refuse substances used for manures, &c.	from 10s. to £1
15.	Determination of the "hardness" of a sample of water before and after boiling	5s.
16.	Analysis of water of land-drainage, and of water used for irrigation	£1
17.	Analysis of water used for domestic purposes	£1 10s.
18.	Determination of nitric acid in a sample of water	10s.
19.	Examination of Viscera for Metallic poison	£2 2s.
20.	Examination of Viscera complete, for metals and alkaloids	£5 5s.
21.	Personal consultation with the Consulting Chemist. (The usual hours of attendance, Monday excepted, will be from 11 to 3, but to prevent disappointment, it is suggested that Members desiring to hold a consultation with the Consulting Chemist should write to make an appointment)	5s.
22.	Consultation by letter	5s.
23.	Consultation necessitating the writing of three or more letters	10s.

The Laboratory of the Society is at 12, Hanover Square, London, W., to which address the Consulting Chemist, Dr. J. AUGUSTUS VOELCKER, requests that all letters and parcels (postage and carriage paid) from Members of the Society, who are entitled to avail themselves of the foregoing Privileges, should be directed.

GUIDE TO THE PURCHASE OF ARTIFICIAL MANURES AND FEEDING STUFFS.

FEEDING CAKES.

1. *Linseed-cake* should be purchased as "Pure," and the insertion of this word on the invoice should be insisted upon. The use of such words as "Best," "Genuine," &c., should be objected to by the purchaser.
2. *Rape-cake for feeding purposes* should be guaranteed "Pure," and purchased by sample.
3. *Decorticated Cotton-cake* should be guaranteed "Pure," and purchased by sample.
4. *Undecorticated Cotton-cake* should be guaranteed "Pure," and purchased by sample.

N.B.—All feeding cakes should be purchased in good condition, and the guarantee of the vendor should be immediately checked by a fair sample (taken out of the middle of the cake) being at once sent for examination to a competent analytical chemist. The remainder of the cake from which the sample sent for examination had been taken should be sealed up in the presence of a witness, and retained by the purchaser for reference in case of dispute.

ARTIFICIAL MANURES.

1. *Raw or Green Bones or Bone-dust* should be purchased as "Pure" Raw Bones guaranteed to contain not less than 45 per cent. of tribasic phosphate of lime, and to yield not less than 4 per cent. of ammonia.
2. *Boiled Bones* should be purchased as "Pure" Boiled Bones guaranteed to contain not less than 48 per cent. of tribasic phosphate of lime, and to yield not less than 1½ per cent. of ammonia.
3. *Dissolved Bones* are made of various qualities, and are sold at various prices per ton; therefore the quality should be guaranteed, under the heads of *soluble* phosphate of lime, *insoluble* phosphate of lime, and nitrogen or its equivalent as ammonia. The purchaser should also stipulate for an allowance for each unit per cent. which the dissolved bones should be found on analysis to contain less than the guaranteed percentages of the three substances already mentioned.
4. *Mineral Superphosphates* should be guaranteed to be delivered in a sufficiently dry and powdery condition, and to contain a certain percentage of *soluble* phosphate of lime, at a certain price per unit per cent., no value to be attached to *insoluble* phosphates.
5. *Compound Artificial Manures* should be purchased in the same manner and with the same guarantees as Dissolved Bones.
6. *Nitrate of Soda* should be guaranteed by the vendor to contain from 94 to 95 per cent. of pure nitrate.
7. *Sulphate of Ammonia* should be guaranteed by the vendor to contain not less than 23 per cent. of ammonia.
8. *Peruvian Guano* should be sold under that name, and guaranteed to be in a dry and friable condition, and to contain a certain percentage of ammonia.

N.B.—Artificial manures should be guaranteed to be delivered in a sufficiently dry and powdery condition to admit of distribution by the drill. A sample for analysis should be taken, not later than three days after delivery, by emptying several bags, mixing the contents together, and filling two tins holding about half a pound each, in the presence of a witness. Both the tins should be sealed, one kept by the purchaser for reference in case of dispute, and the other forwarded to a competent analytical chemist for examination.

INSTRUCTIONS FOR SELECTING AND SENDING SAMPLES FOR ANALYSIS.

ARTIFICIAL MANURES.—Take a large handful of the manure from three or four bags, mix the whole on a large sheet of paper, breaking down with the hand any lumps present, and fold up in tinfoil, or in oil-silk, about 3 oz. of the well-mixed sample, and send it to 12, HANOVER SQUARE, W., by post; or place the mixed manure in a small wooden or tin box, which may be tied by string, but must not be sealed, and send it by post. If the manure be very wet and lumpy, a larger boxful, weighing from 10 to 12 oz., should be sent either by post or railway.

Samples not exceeding 4 oz. in weight may be sent by post, by attaching two penny postage stamps to the parcel.

Samples not exceeding 8 oz., for three postage stamps.

Samples not exceeding 12 oz., for four postage stamps.

The parcels should be addressed: DR. J. AUGUSTUS VOELCKER, 12, HANOVER SQUARE, LONDON, W., and the address of the sender or the number of mark of the article be stated on parcels.

The samples may be sent in covers, or in boxes, bags of linen or other materials. No parcel sent by post must exceed 12 oz. in weight, 1 foot 6 inches in length, 9 inches in width, and 6 inches in depth.

SOILS.—Have a wooden box made 6 inches long and wide, and from 9 to 12 inches deep, according to the depth of soil and subsoil of the field. Mark out in the field a space of about 12 inches square; dig round in a slanting direction a trench, so as to leave undisturbed a block of soil with its subsoil 9 to 12 inches deep; trim this block or plan of the field to make it fit into the wooden box, invert the open box over it, press down firmly, then pass a spade under the box and lift it up, gently turn over the box, nail on the lid, and send it by goods or parcel train to the laboratory. The soil will then be received in the exact position in which it is found in the field.

In the case of very light, sandy, and porous soils, the wooden box may be at once inverted over the soil and forced down by pressure, and then dug out.

WATERS.—The water, if possible, should be sent in a glass-stoppered Winchester half-gallon bottle, which is readily obtained in any chemist and druggist's shop. If Winchester bottles cannot be procured, the water may be sent in perfectly clean new stoneware spirit-jars, surrounded by wickerwork. For the determination of the degree of hardness before and after boiling, only one quart wine-bottle full of water is required.

LIMESTONES, MARLS, IRONSTONES, AND OTHER MINERALS.—Whole pieces, weighing from 3 to 4 oz., should be sent enclosed in small linen bags, or wrapped in paper. Postage 2d., if under 4 oz.

OILCAKES.—Take a sample from the middle of the cake. To this end break a whole cake into two. Then break off a piece from the end where the two halves were joined together, and wrap it in paper, and send by parcels post. The piece should weigh at least from 10 to 12 oz. If sent by railway, one quarter or half a cake should be forwarded, carriage prepaid..

FEEDING MEALS.—About 3 oz. will be sufficient for analysis. Enclose the meal in a small linen bag. Send it by post.

On forwarding samples, separate letters should be sent to the laboratory, specifying the nature of the information required, and, if possible, the object in view.

Members' Veterinary Privileges.

I.—VISITS OF A PROFESSOR OF THE ROYAL VETERINARY COLLEGE.

1. Any Member of the Society who may desire professional attendance and special advice in cases of disease among his cattle, sheep, or pigs, should apply to the Secretary of the Society, or to the Principal of the Royal Veterinary College, Camden Town, London, N.W.

2. The remuneration of the Veterinary Surgeon or a visiting Inspector will be 2*l.* 2*s.* each day as a professional fee, and the charge for personal expenses, *when such have been incurred*, which will in no case exceed one guinea per diem. He will also be allowed to charge the cost of travelling, including railway fare, and one shilling per mile if by road, to and from the locality where his services may have been required. The whole or any portion of these charges may, however, in cases of serious or extensive outbreaks of contagious disease, be remitted, so far as the Members of the Society are concerned, at the discretion of the Council, on such step being recommended to them by the Veterinary Committee.

3. The Consulting Veterinary Surgeon or visiting Inspector, on his return, will report to the Member, and, through the Principal of the Royal Veterinary College, to the Veterinary Committee. In writing, the results of his observations and proceedings with reference to the disease; which Report will be laid before the Council.

4. When contingencies arise to prevent a personal discharge of the duties, the Principal of the Royal Veterinary College may, subject to the approval of the Veterinary Committee, name some competent professional person to act in his stead, who shall be remunerated at the same rate.

II.—CONSULTATIONS WITHOUT VISIT.

Personal consultation with Veterinary Inspector	10 <i>s.</i> 6 <i>d.</i>
Consultation by letter	10 <i>s.</i> 6 <i>d.</i>
Post-mortem examination, and report thereon	2 <i>l.</i>

A return of the number of applications from Members of the Society during each half-year is required from the Consulting Veterinary Surgeon.

III.—ADMISSION OF DISEASED ANIMALS TO THE ROYAL VETERINARY COLLEGE, CAMDEN TOWN, N.W.; INVESTIGATIONS AND REPORTS.

1. All Members of the Society have the privilege of sending cattle, sheep, and pigs to the Infirmary of the Royal Veterinary College, on the following terms, viz. by paying for the keep and treatment of cattle 10*s.* 6*d.* per week each animal, and for sheep and pigs, 3*s.* 6*d.* per week.

2. A detailed Report of the cases of cattle, sheep, and pigs treated in the Infirmary of the College, or on Farms in the occupation of Members of the Society, will be furnished to the Council quarterly; and also special reports from time to time on any matter of unusual interest which may come under the notice of the Officers of the College.

IV.—VISITS OF PROVINCIAL VETERINARY SURGEONS.

The following Veterinary Surgeons have been appointed, at different centres in England and Wales, for the purpose of enabling Members of the Society to consult them with regard to the diseases of cattle, sheep, and pigs.

County.	Name and Address.
Anglesey	Hugh Jones, Brynarron, Llangefni.
Bedford	Henry Crofts, Harper Street, Bedford.
Berks	Henry Allnutt, Thames Street, Windsor.
Brecon	John Price, Brecon.
Bucks	G. A. Lepper, Aylesbury.
Cambridge	G. A. Banham, Downing Street, Cambridge.
Cardigan	Not yet appointed.
Carmarthen	ditto.
Carnarvon	R. Roberts, Market Street, Abergel.
Chester	W. Lewis, 1, South Street, Nantwich Road, Crewe.
Cornwall	Thos. Oliver, Truro.
Cumberland	John Bell, Lonsdale Street, Carlisle.
Denbigh	R. Roberts, Market Street, Abergel.

Members' Veterinary Privileges.

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County.	Name and Address.
Derby	Not yet appointed.
Devon	W. Penhale, Barnstaple.
Dorset... .. .	W. Vessey, Weymouth.
Durham	H. Peele, Tower Street, West Hartlepool.
Essex	James Taylor, Vengewell Hall, Wix Manningtree.
Flint	R. Roberts, Market Street, Abergele.
Glamorgan	Charles Moir, Cardiff.
Gloucester	Professor Garside, Royal Agricultural College, Cirencester.
Hants	J. D. Barford, 57, Above Bar, Southampton.
Hereford	W. Good, 30, Mill Street, Ludlow.
Heris	W. Wilson, Berkhamstead.
Hunts	A. T. Sprague, Kimbolton.
Kent	W. A. Edgar, Westfield House, Dartford.
Lancaster	W. Bromley, Lancaster.
Leicester	John Wiggins, Market Harbo'.
Lincoln (South)	Captain B. H. Russell, Grantham.
Lincoln (Mid)	Charles Hartley, 4, Norman Place, Lincoln.
Lincoln (North)	J. B. Gresswell, Mercer Row, Louth.
Merioneth	Evan Wynne Williams, 1, Queen's Row, Dolgelly.
Metropolis and Middlesex	Royal Veterinary College.
Monmouth	G. Lewis, Monmouth.
Montgomery	James Mc'Cavin, Montgomery.
Norfolk	Calver and Smith, Downham Market.
Northampton	T. J. Merrick, Castilian Street, Northampton.
Northumberland and Westmoreland	C. Stephenson, Sandyford Villa, Newcastle-on-Tyne.
Notts	C. Gresswell, Albert Square, Derby Road, Nottingham.
Oxford	Chas. N. Page, Banbury.
Pembroke	D. E. James, Bridge House, Haverfordwest.
Salop	W. E. Litt, Shrewsbury.
Somerset	T. D. Broad, Broad Street, Bath.
Stafford	Harry Oliver, Trescoe, Tamworth.
Suffolk	A. J. Shorten, 14, Museum Street, Ipswich.
Surrey	J. I. Lupton, Richmond.
Sussex (East)	B. A. Stock, Lewes.
Sussex (West)	J. H. Callow, Horsham.
Warwick	Osborn Hills, Leamington.
Wilts	H. Hussey, Devizes.
Worcester	H. R. Perrins, Upper Butts, Worcester.
York (East Riding)	James Jebson, Yapham Grange, Pocklington.
York (North Riding)	W. Barker, Middlesborough.
York (West Riding)	Joseph Carter, 28, Great Horton Road, Bradford.

Members may obtain the attendance of a Provincial Veterinary Surgeon in any case of disease by paying his travelling expenses (which include railway fares, and 1s. per mile if by road, including the return journey), and the cost of his visit, which will be at the following rate, viz. :—

	£	s.	d.
When the whole day is occupied	1	10	0
When half a day or less is occupied	0	15	0
Personal consultation with Veterinary Surgeon	0	10	0
Consultation by letter	0	5	0
Post-mortem examination and report thereon	1	0	0

A return of the number of applications from Members of the Society during each half-year, embodying a statement of those cases which may be of public interest, is required from each Provincial Veterinary Surgeon. These half-yearly reports should reach the Secretary by the end of May and November respectively.

Members' Botanical and Entomological Privileges.

The Council have fixed the following rates of charge for the examination of Plants, Seeds, and Insects for the *bona fide* and individual use and information of Members of the Society (not being seedsmen), who are particularly requested, when applying to the Consulting Botanist, or to the Honorary Consulting Entomologist, to mention the kind of examination they require, and to quote its number in the subjoined schedule. The charge for examination must be paid at the time of application, and the carriage of all parcels must be prepaid.

I. BOTANICAL.

No.

- 1.—A report on the purity, amount, and nature of foreign materials, the perfectness, and germinating power of a sample of seed .. 5s.
- 2.—Determination of the species of any weed or other plant, or of any epiphyte or vegetable parasite, with a report on its habits, and the means for its extermination or prevention .. 5s.
- 3.—Report on any disease affecting farm crops .. 5s.
- 4.—Determination of the species of a collection of natural grasses found in any district, with a report on their habits and pasture value 10s.

N.B.—The Consulting Botanist's Reports are furnished to enable Members,—purchasers of seeds and corn for agricultural purposes,—to test the value of what they buy, and are not to be used or made available for advertising or trade purposes by seedsmen or otherwise.

INSTRUCTIONS FOR SELECTING AND SENDING SAMPLES.

In sending seed or corn for examination the utmost care must be taken to secure a fair and honest sample. In the case of grass-seeds the sample should be drawn from the centre of the sack or bag, and in all cases from the bulk delivered to the purchaser. If anything supposed to be injurious or useless exists in the corn or seed, selected samples should also be sent.

When possible, at least one ounce of grass and other small seeds should be sent, and two ounces of cereals or larger seeds. The exact name under which the seed has been bought (but preferably a copy of the invoice) should accompany the sample.

Grass seeds should be sent at least four weeks, and clover seeds two weeks before they are to be used.

In collecting specimens of plants, the whole plant should be taken up, and the earth shaken from the roots. If possible, the plants must be in flower or fruit. They should be packed in a light box, or in a firm paper parcel.

Specimens of diseased plants or of parasites should be forwarded as fresh as possible. Place them in a bottle, or pack them in tinfoil or oil-silk.

All specimens should be accompanied with a letter specifying the nature of the information required, and stating any local circumstances (soil, situation, &c.) which, in the opinion of the sender, would be likely to throw light on the inquiry.

Parcels or letters containing seeds or plants for examination (carriage or postage prepaid) must be addressed to Mr. W. CARRUTHERS, F.R.S., Central House, Central Hill, Norwood, S.E.

It is necessary that before the purchaser of seeds send the sample for examination he secure—

1. That the vendor specify the nature of the article supplied.
2. That the bulk be true to the bulk specified.
3. That it contain not more than 5 per cent. of seeds other than the species ordered.
4. That the germinating power shall be, for cereals, green crops, clovers, and timothy grass, not less than 90 per cent.; for fox-tail, not less than 50 per cent.; and for other grasses not less than 70 per cent.

The Council strongly recommend that the purchase of prepared mixtures should be avoided, and that the different seeds to be sown should be purchased separately.

II. ENTOMOLOGICAL.

Determination of the species of any insect, worm, or other animal which, in any stage of its life, injuriously affects farm crops, with a report on its habits and suggestions as to its extermination .. 2s. 6d.

Parcels or letters containing insects, or plants apparently infested with insects, sent for examination, must be addressed to Miss OMEROD, F.R.Met.Soc., Dunster Lodge, Spring Grove, Isleworth.

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